July 2021

Binder 181, Plagiorchiidae Haenatoleoechinae [Trematoda Taxon Notebooks]

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Haematoloechinae nom. emend. for Haematoloecinae Teixeira de Freitas et Lent, 1939

Subfamily diagnosis. — Plagiorchiidae: Body elongate, more or less attenuated anteriorly, spinose or not. Oral sucker and pharynx well developed, esophagus short, ceca terminating at or near posterior extremity. Acetabulum rather small, in anterior or middle third of body. Testes diagonal or subsymmetrical, usually in posterior half of body. Cirrus pouch cylindrical or claviform, long, winding between two suckers. Genital pore usually ventral to pharynx or esophagus, rarely postbifurcal. Ovary near acetabulum, receptaculum seminis large. Vitelline follicles forming distinct bunches, extending along ceca for their greater part or entire length. Uterus occupying all available space of hindbody, describing longitudinal extracecal loops, which extend forward to different levels. Parasitic in lungs.

Haematoloechus Looss, 1899, nec *Haematoloecha* Stål, 1874

Syn. *Pneumonoeces* Looss, 1902
Ostiolum Pratt, 1903
Pneumobites Ward, 1917
Skrjabinoeces Sudarikov, 1950

Generic diagnosis. — Plagiorchiidae, Haematoloechinae: Body elongate, more or less attenuated anteriorly, spinulate or not. Acetabulum small, in anterior or middle third of body. Oral sucker well developed. Esophagus short. Ceca simple, terminating at or near posterior extremity. Testes diagonal or nearly symmetrical, usually in posterior half of body; cirrus pouch cylindrical or claviform, may be very long, containing seminal vesicle, prostatic complex and eversible ductus ejaculatorius. Genital pore ventral to pharynx or esophagus. Ovary lobed or not, near acetabulum. Receptaculum seminis large. Laurer's canal absent. Vitellaria forming bunches of follicles, extending along ceca for their greater part or entire length. Uterus occupying all available space of hindbody as well as intercecal field of forebody, describing longitudinal extracecal loops which may extend forward to specifically different levels; eggs exceedingly numerous, brown, embryonated. Excretory vesicle Y-shaped. Parasitic in lungs of amphibians.

Genotype: *H. variegatus* (Rud., 1819) (Pl. 41, Fig. 513), in *Rana esculenta*, and *R. temporaria;* Europe. Also in *R. esculenta ridibunda*, Asia Minor; Morocco; *R. catesbiana* and *R. pipiens*, N. America — Walton (1947, 48, 50); *Rana mascareniensis*, Belgian Congo. Adolescaria found free in *Calopteryx virgo* — Sinitzin (1907).

Other species:

H. almorai (Pande, 1937) in *Rana cyanophlyctis;* India.
H. asper Looss, 1899, in *Rana esculenta;* Europe.
H. australis (Johnston, 1912) in *Hyla aurea* and *Limnodynastes peronii;* Australia.
H. brèviansa (Sudarikov, 1950), (Pl. 39, Fig. 485), syn. *Skrjabinoeces b.* S., in *Rana ridibunda;* Russia.
H. breviplexus Stafford, 1902 in *Rana catesbiana, R. clamitans, R. pipiens, R. virescens, Bufo americanus;* Canada, U.S.A.
H. buttensis Ingles, 1936, in *Rana boyli;* U.S.A.
H. capyristes (Klein, 1905) in *Rana hexadactyla;* India.
H. coloradensis (Cort, 1915) in *Rana pipiens;* Colorado. Also in *R. pipiens, R. montezumae;* U.S.A., Mexico.
H. complexus (Seely, 1906) in *Rana pipiens;* N. Carolina. Also in *R. catesbiana, R. clamitans*, N. America; *R. montezumae;* Mexico.
Xiphidiocercaria with five pairs of penetration glands develops in *Pseudosuccinea columella*, encysts in labium and leg of dragonfly nymph — Krull (1933, 34).
H. confusus Ingles, 1932, syn. of *H. oxyorchis* Ingles, 1932 — Manter, 1938, in *Rana aurora draytoni;* California.
H. elongatus Caballero et Sokoloff, 1934, in *Rana montezumae;* Mexico.
H. floedae Harwood, 1932, in *Rana catesbiana* and *R. clamitans;* Florida.
H. formosus (Pratt, 1903), syn. *Ostiolum formosum* Pratt, 1903, in frogs. Probably identical with *H. medioplexus* — Stafford (1905).
H. fuelleborni (Travassos et Darriba, 1930) in *Bufo marinus;* Brazil.
H. illimis Caballero, 1943, in *Rana montezumae;* Mexico.
H. iturbei (Cordero et Vogelsang, 1939) in *Rana palmipes;* Venezuela.

H. joholensis (Fukui et Ogata, 1938) in *Rana nigromaculata nigromaculata* Johol, Manchuria.

H. kernensis (Ingles, 1932) in *Rana aurora draytoni;* California.

H. lobatus (Seno, 1907) in *Rana nigromaculata;* Japan.

H. longiplexus Stafford, 1902, syn. *Pneumobites longiplexus* (Stafford) Ward, 1917, in *Rana catesbiana;* Canada, U.S.A. Also in *R. pipiens, R. grylio;* U.S.A.

Snail host not determined. Metacercaria in damsel-fly, *Lestes vigilax*, fed to bull frog — Krull (1932).

H. lutzi Freitas et Lent, 1939, in an undetermined frog; Venezuela.

H. macrorchis Caballero, 1941, in *Rana montezumae* and *R. pipiens;* Mexico.

H. medioplexus Stafford, 1902 (syn. *Ostiolum formosum* Pratt, 1903) in *Bufo lentiginosus* and *Rana virescens;* Canada. Also in *R. clamitans, R. pipiens R. palustris,* N. America; *R. montezumae* and *R. pipiens,* Mexico; *R. palmipes;* Colombia.

Cercaria belonging to the ornate group of xiphidiocercaria develops in *Planorbula armigera,* is swept into the branchial basket of dragonfly nymph. Encysted metacercaria becomes infective after a six days' sojourn in the nymph, and attains maturity in the frog (*Rana pipiens* in 28 to 30 days) — Krull, 1930.

H. nanchangensis Hsiung, 1934, in *Rana plancyi;* China.

H. nanchangensis major (Yamaguti, 1936) in *Rana nigromaculata;* Japan.

H. neivai (Travassos et Artigas, 1927), syn *Pneumonoeces planorbinus* Lutz, 1928; *P. pseudis* Lutz, 1928, in *Leptodactylus ocellatus; L. pentadactylus;* Brazil. Also in *Pseudis paradoxa, Rana palmipes;* Venezuela.

H. oxyorchis Ingles, 1932, in *Rana aurora, R. boyli;* U.S.A.

Lophocercous xiphidiocercaria develops in *Planorbis parvus;* encysted metacercaria found in adults of *Sympetrum illotum* and in *Plathemis lydia* — Ingles (1933).

H. ozorioi (Freitas et Lent, 1939) in *Leptodactylus ocellatus;* Uruguay.

H. parviplexus (Irwin, 1929), syn. *Pneumobites parviplexus* Irwin, 1929; in *Rana clamitans. Gyraulus parvus; Sympetrum rubicundulum, S. obtrusum* — Krull (1931).

H. parvivitellosus Caballero, 1942, in *Rana montezumae;* Mexico.

H. pulcher Bravo, 1943, in *Amblystoma tigrinum;* Mexico.

H. rappiae (Szidat, 1932), syn. *Haplometroides rappiae* Szidat, 1932, in *Rappia concolor;* Liveria.

H. schultzei (Wundsch, 1911) in *Rana;* Europe. Also in *R. amurensis;* Siberia — Walton, 1947.

H. sibiricus (Issaitschikow, 1927) in *Rana arvalis altaica, R. amurensis;* Siberia.

H. sibiricus japonicus (Yamaguti, 1936) in *Rana nigromaculata:* Japan.

H. similiplexus Stafford, 1902, in *Rana virescens, R. pipiens, R. clamitans, Bufo lentiginosus, B. americanus;* Canada, U.S.A.

H. similis Looss, 1899, syn. *H. similigenus* Stiles et Hassall, 1902; *Skrjabinoeces similis* (Looss) Sudarikov, 1950, in *Rana temporaria R. esculenta;* Europe. Also in *R. esculenta ridibunda;* N. Africa.

H. tejerae Cordero et Vogelsang, 1939, in *Rana palmipes;* Venezuela.

H. tientsinensis Hsiung, 1934, in *Rana nigromaculata* and *R. plancyi;* China.

H. tumidus Ingles, 1932 in *Rana aurora draytoni;* U.S.A.

H. uniplexus Harwood, 1932 in *Rana sphenocephala;* U.S.A.

H. variegatus abbreviatus Bikhovskii, 1932, in *Bombinator igneus;* Kiew.

H. varioplexus Stafford, 1902, in *Rana* spp., *Bufo americanus;* U.S.A. Canada.

H. volgensis (Sudarikov, 1950) (Pl. 39, Fig. 487), syn. *Skrjabinoeces v.* S., in *Rana esculenta;* Russia.

SKRJABINOECES Sudarikov, 1950

Ref reprint

DISCUSSION Haematoloechus

As Cort (1915) has pointed out Digenea have been known from the lungs of Anura for over a century. *Haematoloechus* is one of the commonest genera involved, the name having been given by Looss (1899) to *Distomum variegatum* described by Rudolphi (1819) from the lungs of *Rana esculenta* L. and *R. temporaria* L. in Europe. Looss chose *Haematoloechus variegatus* (Rud.), as the type species, from a mixture of three species in the same sample. The other two he named *H. similis* and *H. asper*. Later Looss (1902) changed the generic name to *Pneumonoeces* because of the existence of Stal's hemipteran genus *Haematoloecha* established in 1874. *Pneumonoeces* has since been widely used, but Harwood (1932) pointed out that, according to the international code, a generic name is not to be considered preoccupied when it differs only in the ending from a genus already published. *Haematoloechus*, therefore, must take priority over *Pneumonoeces*. Ingles (1932) has expressed the same opinion.

The subfamily Haematoloechiinae of the family Plagiorchiidae now includes four genera: *Haematoloechus* Looss, 1899, *Ostiolum* Pratt, 1903, *Ostioloides* Odening, 1960 and *Neohaematoloechus* Odening, 1960. Pratt (1903) described *Ostiolum formosum* from North American frogs. This was later found to be synonymous with *O. medioplexus* originally described by Stafford (1902) as *Haematoloechus medioplexus* from *Bufo lentigenosus* Shaw and *Rana virescens* Kalm. in America. Odening (1960), in his revision of the subfamily, accepted the genus *Ostiolum* stating that the diagnostic features are the long intestinal caeca which extend throughout the length of the body and the absence of extracaecal uterine loops. There are nine species, all of which were originally placed in the genus *Haematoloechus* and were recorded from West Africa by Szidat (1932), the United States by Pratt (1903) and Ingles (1932) and from South America by Caballero & Sokoloff (1934). Odening (1960) erected the genus *Ostioloides* for the species originally described as *Haplometroides rappiae* by Szidat (1932) from *Rappia concolor* Hallow in Liberia. This is the only species in the genus of which the diagnostic features are the shorter intestinal caeca extending only as far as the hinder third of the body and the absence of extracaecal uterine loops. The genus *Neohaematoloechus*, also, was erected by Odening (1960). It includes two species characterized by the presence of long intestinal caeca, extracaecal uterine loops and no ventral sucker. *N. neivae* was originally described as *Haematoloechus neivae* by Travassos & Artigas (1927) from *Leptodactylus ocellatus* in Brazil and *Pseudis paradoxa* Pallas and *Rana palmyses* Spix in Venezuela. *N. iturbei* was described as *Pneumonoeces iturbei* by Cordero & Vogelsang (1939) from *Rana palmipes* in Venezuela.

The three main features of the genus *Haematoloechus* are, according to Odening (1960), the possession of long intestinal caeca, extracaecal uterine loops and a ventral sucker. He recognizes three subgenera, namely, *Skrjabinoeces*, *Haematoloechus* and *Anomolecithus* based on the arrangement of the vitellaria. In the subgenus *Skrjabinoeces* the vitellaria do not extend to the hinder extremity but only to half way along the length of the posterior testes. Sudarikov (1950) originally proposed *Skrjabinoeces* as a generic name for such forms. Odening (1960) includes three species in this subgenus, namely, *Haematoloechus* (*Skrjabinoeces*) *similis* Looss, 1899, from *Rana temporaria* and *R. esculenta* in Europe, *H.* (*S.*) *similis volgensis* (Sudarikov, 1950) from *R. esculenta* L. in Russia and *H.* (*S.*) *breviansa* (Sudarikov, 1950) from *R. ridibunda* Pallas in Russia. In the subgenera *Haematoloechus* and *Anomolecithus* the vitellaria extend to the posterior extremity; in the former they consist of follicles arranged in rosette-shaped or regular grape-like clusters and in the latter in irregular grape-like clusters or scattered singly. Odening divides the subgenus *Anomolecithus* into three groups: *asper* containing two subspecies, *nanchangensis* three subspecies and *tumidus* four subspecies.

Ward (1917) proposed the generic name *Pneumobites* for two species of *Haematoloechus*, namely, *H. longiplexus* Stafford, 1902, from *Rana catesbiana* Shaw and *H. breviplexus* Stafford, 1902, from *R. catesbiana* and *R. virescens* Kalm. This generic name is no longer recognized, both species being placed in the genus *Haematoloechus*.

The subgenus *Haematoloechus* was divided by Odening (1960) into five groups: *variegatus* with nine subspecies, *sibiricus* with four subspecies, *breviplexus* with three subspecies, *longiplexus* with two subspecies and *varioplexus* with three subspecies, a total of twenty one.

Odening's list was very comprehensive including all species of the subfamily described at that time. Previous attempts had been made to arrange keys for identifying various species; Klein (1905) compiled a key for identifying nine species and Bychowsky (1932) for seventeen species.

Since the publication of Odening's (1960) paper Skrjabin & Antipin (1962) have reviewed the Plagiorchiidae, Pneumonoecinae, and have described two new species, namely, *P. caballeroi* and *P. travadarribus*. They retain the genus *Pneumonoeces* and include, also, *P. sudarikovi* described by Bellours in 1962. They recognize the genera *Neohaematoloechus* and *Ostiolum* but retain *Haplometroides* and *Skrjabinoeces*.

The two species of *Haematoloechus* described in the present paper fall into the subgenus *Haematoloechus*. *H.* (*H.*) *exoterorchis* does not fit into any of the five groups recognized by Odening (1960). It is doubtful, also, if *H.* (*H.*) *micrurus* does. The nearest to the latter would be the group *longiplexus*.

Species of the genus *Haematoloechus* have been reported from every continent. The species will not be listed here but some of the records are as follows: from Europe by Looss (1899), Wundsh (1911) and Travassos & Darriba (1930); from India by Klein (1905) and Pande (1937); from Russia by Bychowsky (1932), Sudarikov (1950), Odening (1960) and Skrjabin & Antipin (1962); from Asia by Issaitschikow (1923); from Japan by Yamaguti (1936); from China by Hsiung (1934); from Africa by Rudolphi (1819); from Canada by Stafford (1902); from the United States by Harwood (1932), Irwin (1929) and Ingles (1932, 1936); and from South America by Caballero (1942) and Freitas & Lent (1939).

Only two species of *Haematoloechus* have so far been recorded from Africa, namely, *H.* (*H.*) *variegatus variegatus* (Rud. 1819) the type species, from *Rana mascarenonsis* in the Belgian Congo and from *R. esculenta ridibunda* in Morocco and *H.* (*S.*) *similis similis* Looss, 1899, from *R. esculenta ridibunda* in North Africa. Neither of these is identical with the two species described in this paper. No species of *Haematoloechus* has so far been recorded from Ghana nor from the lungs of *Rana occipitalis*. Although the present species are new they both resemble, in certain features, other species of the genus. *H.* (*H.*) *exoterorchis* is easily distinguished from all others by the position of the testes on the outer side of the intestinal caeca between them and the lateral margin and also by the arrangement of the vitellaria. Cuticular spines are absent as in *H. kernensis* Ingles and *H.* (*H.*) *sibiricus sibiricus* Issaitschikow, but in these the oral sucker is the same size as, or slightly larger than, the ventral sucker while in *H.* (*H.*) *sibiricus tientsinensis* Hsiung the ventral sucker, as in *H.* (*H.*) *exoterorchis*, is larger than the oral sucker. The size of the eggs is invariably a diagnostic feature, the nearest in this respect is *H.* (*H.*) *sibiricus japonicus* Yamaguti where the eggs measure 0·025–0·037 mm. × 0·015–0·021 mm.

Haematoloechus (*H.*) *micrurus* differs from all other species in the presence of the tail-like appendage. The extracaecal uterine loops are long but not as long as in *H.* (*H.*) *longiplexus longiplexus*. There are, also, other differences between these two species.

From Rees, 1964

HAEMATOLOECHUS Looss,1899

Type species: H.variegatus (Rud.)

Others: H.almorai Pande,1937
H.asper Looss
H.australis Johnston
H.breviplexus Cort
H.buttensis Ingles,1936
H.capyristris Klein
H.coloradensis Cort,1915
H.complexus Seeley,1906
H.confusus Ingles,1932
H.elongatus Caballero & Sokoloff,1934
H.floedae Harwood,1932
H.fulleborni
H.kernensis Ingles,1932
H.longiplexus Stafford
H.medioplexus Stafford,1902
H.nanchangensis Hsiung,1934
H.neivai Travassos & Artigas
H.oxyorchis Ingles,1932
H.parviplexus Irwin,1929
H.schulzei Wundsch
H.sibiricus Issaitschikow,1927
H.similis Looss
H.tientsinensis Hsiung,1934
H.tumidus Ingles,1932
H.uniplexus Harwood,1932
H.varioplexus Stafford

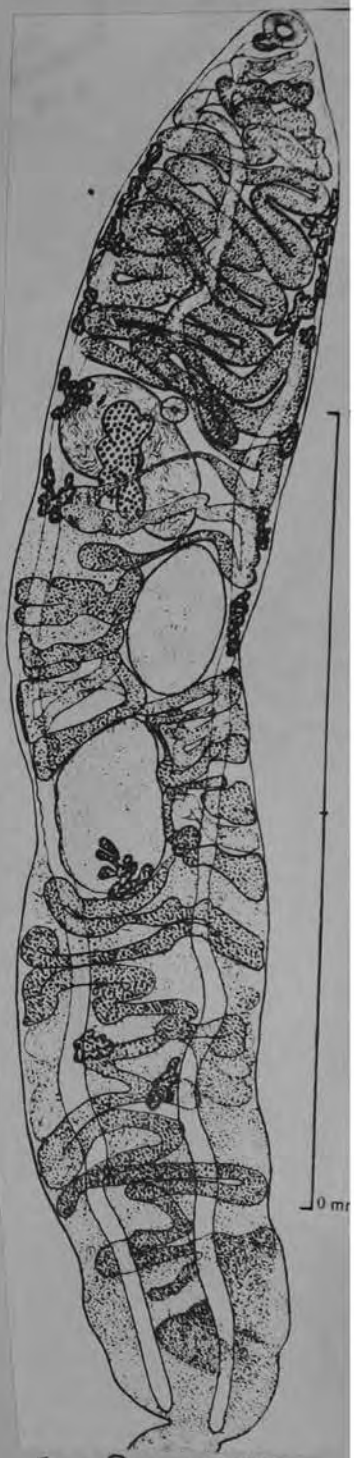
H.variegatus abbreviatus

Plagiorchiidae

Haematoloechus variegatus (Rud., 1819)

D FROM RANA IBERICA
NGER, 1879 AND R.
PORARIA TEMPORARIA
751 AT LAGUNA GRANDE
RRA DE GREDOS, ESPAGNE)
OMBES AND KNOEPFFLER
5)

" HAEMATOLOECHUS
VARIEGATUS R.
APTER LOOSS "
FROM PRATT, 1902



FROM DOLLFUS, 1950
HOST: RANA MASCARENGNEIS
LOC: BELGIAN CONGO

Haematoloechus
Pneumonaeces almorai, n. sp. (Pande, 1937)

The worms are fairly large, flattened and elongated, with a narrower and somewhat pointed anterior portion and a rounded posterior end. The longest specimen measures 7 in length and 1·6 in maximum breadth which lies in the testicular zone of the hinder body. The thick cuticle is devoid of spines. The subcuticular cells form a compact thick layer throughout the body. The subterminal oral sucker, 0·29–0·32 in diameter, is double the size of the acetabulum. The globular pharynx is 0·13–0·16 in diameter. The œsophagus measures 0·18–0·4 in length. The wide and sinuous intestinal cæca which extend posteriorly to the middle of the post-vitelline region are seen red in the living worm on account of the contained blood. The genital pore lies median between the pharynx and the intestinal bifurcation nearer the former in the fully extended worm. The main stem of the Y-shaped excretory bladder divides into the cornua near the posterior end of the receptaculum seminis.

The elongated ovary, 0·66 × 0·32 in size, is situated to the left side of the median line in the middle of the body. On its outer wall, internal to the left intestinal cæcum, there is an indentation which divides it into spherical anterior and elongated posterior halves. The posterior half, in all the specimens, has the convex outer and concave inner sides. The voluminous receptaculum seminis, 0·5 × 0·29 in size, lies just behind the acetabulum in level with, and ventrally and mesially to, the ovary. The Mehli's gland is situated just in front of the receptaculum seminis in the acetabular field. After its origin from the Mehli's gland, the uterus which is literally packed with countless eggs passes to the posterior end of the body and just in front it runs external to the cæcum of the ovarian side forming the characteristic longitudinal extracæcal fold. After pursuing a similar course outside the cæcum on the other side of the body, the uterus forms the ascending limb which closely resembles the descending loop as far as the acetabulum. In front of the latter, the uterus, in a number of transverse coils which never extend beyond the outer borders of the cæca, proceeds forwards to the genital pore where it opens through a metraterm of about 0·41 length. The ripe eggs are operculate, elongate oval and light brown in colour, measuring 0·17 × 0·07 in size. The vitellaria, in approximately 21 grape-like bunches, extend from near the beginning of the second quarter of the body to about one-eighth of body length from the posterior extremity. The groups are arranged in 2 patches of equal number. The anterior one lies in front of the acetabulum and the posterior in the testicular zone along the lateral sides of the testes and between the posterior testis and the hinder ends of the intestinal cæca. Between these two, there is a solitary group external to the ovary. Mostly the follicles are arranged along the cæca but some of the anterior and posterior groups are intercæcally placed.

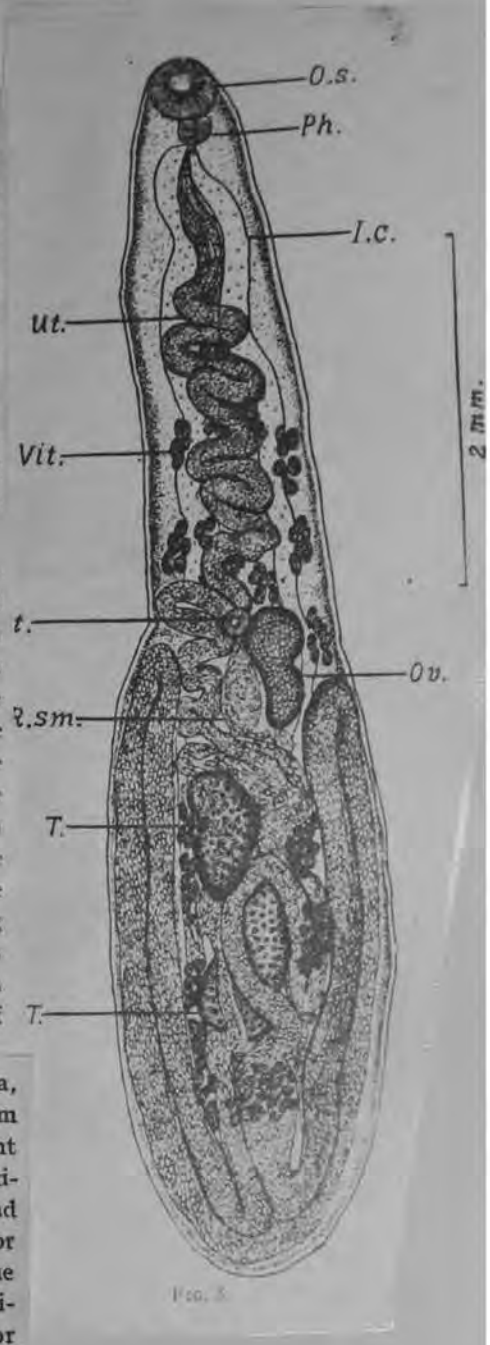


Fig. 5.

The testes are large, elongated, with smooth or slightly irregular outline. The anterior testis lies just behind the ovary and the receptaculum seminis on the side opposite to that of the ovary and measures 0·72 × 0·4 in size. The posterior testis, 0·95 × 0·47 in size, is more elongated than the anterior one and lies obliquely to it with its anterior part on the same side as the ovary. The long cirrus-sac, 1·5–1·7 in length and 0·11 in maximum breadth, is narrow and tubular extending posteriorly to one-fourth of the body length from the anterior extremity with its posterior end below the dorsal row of the intracæcal vitelline follicles. It contains a vesicula seminalis of about 0·99 length, which is nearly straight posteriorly but much coiled anteriorly. The pars prostatica is indistinguishable, the seminal vesicle continuing into an ejaculatory duct which terminates in a cirrus.

Habitat—Lungs.

Locality—Almora.

Remarks.—The illustrated resumé of the lung flukes from the Amphibia Anura have been given by Travassos and Darriba (1930) and Caballero and Sokoloff (1934) respectively. After a comparison with all the species of the genus *Pneumonœces*, to which the present form evidently belongs, it is found that it does not fit in any one of the already known species. The new species, however, shows closer affinities to *P. variegatus* Rudolphi, 1819, than to any other species on account of its aspinose cuticle, the position of the acetabulum which is smaller than the oral sucker, configuration of the uterus, and the arrangement of the vitellaria, but differs from it in the sucker ratio, in the slightly more posterior position of the genital pore, the character and extent of the cirrus-sac, shape and position of the ovary and testes and the size of its eggs. The South Indian species, *P. campyristis* Klein, 1905, agrees with *P. almorai* in its smooth skin, in the ratio of the oral sucker to the acetabulum, position and shape of the testes, and arrangement of the uterine coils but is separated from it by the position of its genital pore in the region of the intestinal bifurcation, the extent and shape of its cirrus-sac, the oval shape of its ovary, the smaller number of the vitelline groups, and the larger size of the eggs.

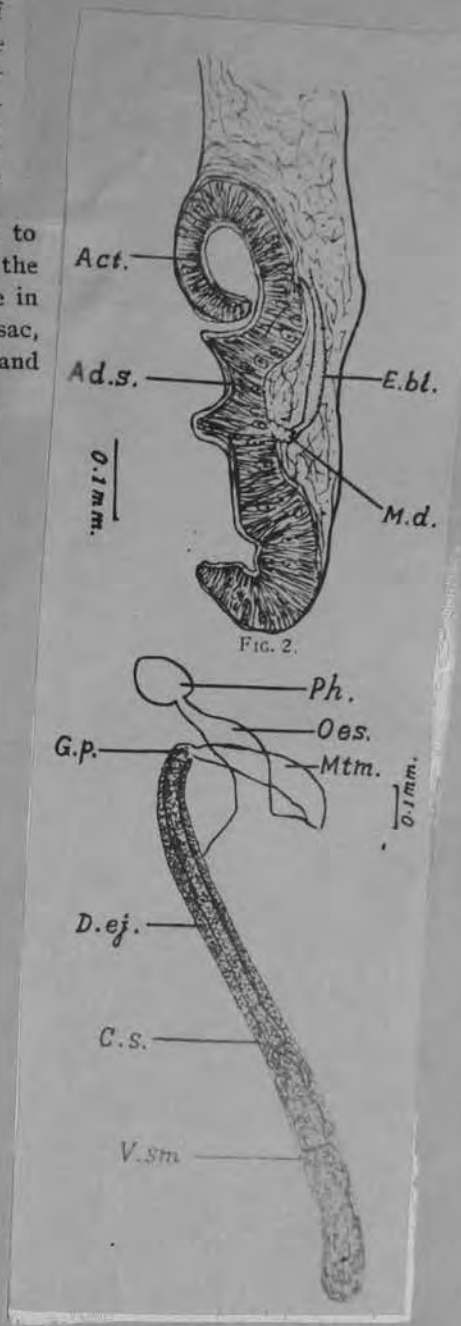


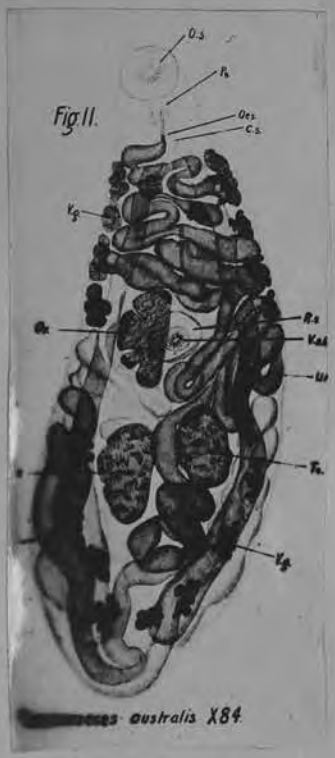
FIG. 2.

Plagiorchidae

Haematoloechus

Pneumonoeces australis Loos & Johnston 1912

Elongated worms, oval, narrower in front, 3.5mm long by 1.52mm broad. Skin smooth, without spines. Oral sucker 0.398mm., ventral 0.193mm. in diameter; ratio of oral to ventral 2:1. Pharynx equal in size to ventralsucker; oesophagus short; intestinal limbs reaching almost to posterior end of body. Genital opening on ventral surface, near middle line, just behind oral & sucker. Testes very large, oval, with a few deep groves, the posterior testis longer and narrower than anterior; situated in the posterior part of the body, on either side of the median line, one a little behind the other. Cirrus sac & very long and tubular, with a slightly coiled vesicula seminalis: a strong cirrus and ejaculatory duct. Ovary deeply lobed, large and elongated, laterally placed in front of posterior testis, on a level with the ventral sucker. Receptaculum seminis very large, on a level with &, and ventral to the ovary, Yolk glands in four main groups, a pair of anterior groups, each of 4 or 5 bunches of 12-15 follicles. Eggs very small, 0.020 x 0.014 mm.
Hosts: Hyla aurea and Limnodynastes peronii
Locality : Australia



FISCHTHAL AND KUNTZ, 1965

Ostiolum borneoensis n. sp. (Figs. 3, 4)

HOST: *Rana erythraea* (Ranidae).

HABITAT: Small intestine (probably should be lungs).

LOCALITY: Penampang, North Borneo.

DATE: 1 September 1960.

TYPE: U.S.N.M. Helm. Coll. No. 60936 (one slide of holotype and three with one paratype each).

DIAGNOSIS (based on four specimens): Body, length 4,950 to 5,995, width (in two) 514 to 629 and depth (in two) 483 to 575 at anterior margin of vitellaria, width 706 to 920 and depth 744 to 767 at testicular level; narrower anteriorly and gradually widening to testicular region, both extremities bluntly rounded. Cuticle thick, fine spines from anterior extremity to ovarian level, sparse but more numerous anteriorly than posteriorly. Forebody (in one) 1,575, hind body (in one) 4,322, posttesticular space 1,467 to 1,672. Gland cells in parenchyma on each side of pharynx and at posterolateral margins of oral sucker, ducts leading anteriorly to anterior extremity. Oral sucker, length 313 to 327, width (in two) 316 to 320, depth (in two) 287 to 305, subterminal ventral, mouth anteroventral. Acetabulum (in one) 98 long, 57 deep, small, poorly developed, at about anterior body fourth. Sucker length ratio (in one) 1 : 0.31. Prepharynx very short, almost nonexistent. Pharynx, length 141 to 160, width (in two) 147 to 150, depth (in two) 141 to 147, overlapping posterior part of oral sucker ventrally. Esophagus short, displaced by body contraction. Cecal bifurcation close behind pharynx. Ceca inflated, extending 137 to 200 from posterior extremity, containing host blood cells throughout length. Excretory system obscured by eggs.

Testes two, smooth to slightly lobed, longitudinally elongate, slightly diagonal, in contact or slightly separated, mostly intercecal, occupying region from mid-body length posteriorly; anterior (left) testis, length 537 to 652, width (in three) 253 to 407, depth (in one) 391; posterior (right) testis, length 621 to 752, width (in three) 322 to 384, depth (in one) 391. Cirrus sac (in one) 1,000 in longitudinal extent, 80 deep, long, sinuous, slightly muscular, relatively thick walled, commencing 1,280 from anterior extremity and 295 preacetabular, containing seminal vesicle 707 in longitudinal extent by 70 deep, pars prostatica, prostate cells, and muscular cirrus. Genital atrium short. Genital pore ventral to posterior half of oral sucker, submedian to left.

Ovary, length 544 to 698, width (in two) 284 to 307, depth (in two) 322 to 368, longitudinally elongate, deeply lobed compared to testes, lobes few, mostly intercecal, median or slightly submedian to right, 1,250 to 1,713 from anterior extremity, 40 postacetabular (in one). Seminal receptacle, length (in three) 310 to 405, width (in one) 380, depth (in two) 258 to 346, ventral to ovary. Mehlis' gland well developed, at ovarian level. Oviduct short, thick walled, muscular, arising from about mid-length of median side of ovary. Vitellaria mainly in lateral groups of eight to nine symmetrical, rosettelike follicular clusters, fields confluent dorsally at anterior and posteriormost levels, commencing 775 to 960 from anterior extremity, terminating 683 to 1,290 from posterior extremity. Vitelline reservoir at posterior margin of ovary, common vitelline duct entering oviduct. Uterus extensively coiled, overlapping ceca and extending to lateral body margins especially in posterior body half, many coils extending from one side of body to other, anteriorly directed extracecal loops absent. Metraterm thick walled, shorter than cirrus sac. Eggs numerous, brown, operculate, 20 measuring 17 to 23 by 11 to 15.

DISCUSSION: Because of the mass of brown eggs in the uterus the poorly developed acetabulum and the extent of the cirrus sac were completely masked from view in all but one specimen mounted in lateral view. For the same reason the extent of the pars prostatica and uterus could not be determined. In lacking anteriorly directed extracecal loops our form fits the genus *Ostiolum* Pratt, 1902. Except for one species reported from Africa this genus is known only from North America. Odening (1958) considered *Ostiolum* a subgenus of the genus *Haematoloechus* Looss, 1899, but later (1960a) returned it to generic status with nine valid species. Yamaguti (1958) listed it as a synonym of the genus *Haematoloechus*. Skrjabin and Antipin (1962) considered *Ostiolum* a valid genus containing 11 species. In the key to the species groups of the subfamily Haematoloechinae Freitas and Lent, 1939 (syn. Pneumonoecinae Mehra, 1937) given by Odening (1960a) our form keyed to a choice between the *coloradense* group of *Ostiolum* and *O. medioplexus* (Stafford, 1902) but would not entirely fit either. In the key the *coloradense* group differs in having a sucker length ratio of 1 : 0.63 to 0.86, while *O. medioplexus* differs in having its entire cuticle spined; both differ in geographical distribution. In the key to the species of *Ostiolum* given by Odening (1960a) our form keyed to *O. medioplexus*. In the latter paper Odening presented a composite description of the latter species based on five earlier accounts. *O. medioplexus* differs further from our form in having the genital pore at the posterior margin of the pharynx, the testes never elongated, the ovary anterior to the seminal receptacle, and the vitellaria not in symmetrical clusters. Odening (1964) erected the family Haematoloechidae, placing therein the genera *Haematoloechus* (type), *Ostiolum*, *Neohaematoloechus* Odening, 1960, and *Ostioloides* Odening, 1960.

Plagiorchiidae

Skrjabinoeces breviansa Sudarikov, 1950

Host: Rana ridibunda

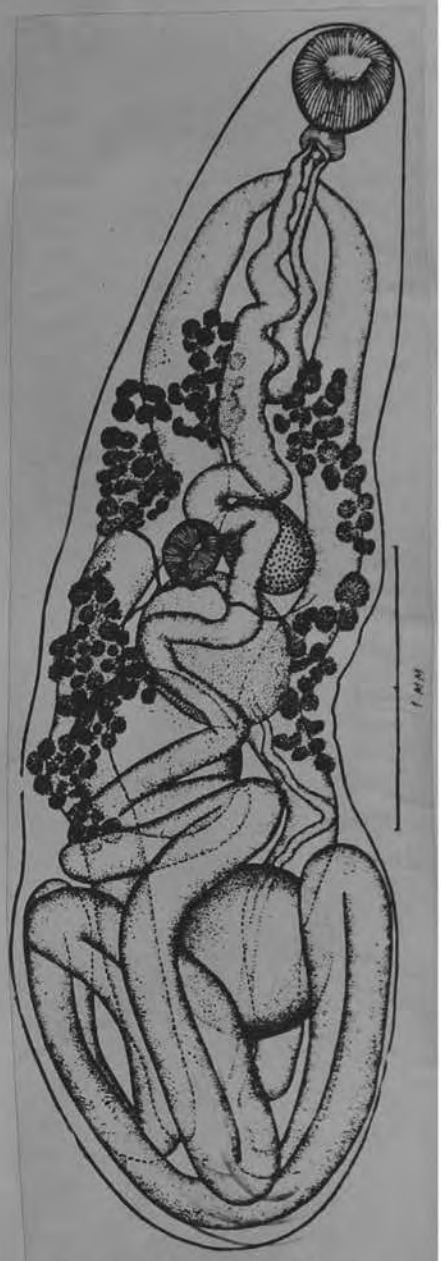


Рис. 4. *Skrjabinoeces breviansa* nov. gen. nov. sp.

Haematoloechus breviplexus Stafford, 1902

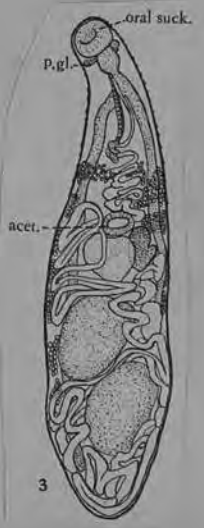
FIGS FROM CORT (1915)

Haematoloechus buttensis n. sp. Ingles, 1936
(Plate XVI, fig. 3)

Harwood (1932) and Ingles (1932a) independently and simultaneously revived *Haematoloechus* as a genus of frog lung flukes. The genus is a large one being represented by species all over the world. In the description of this new species the averages and ranges of the various measurements were made from ten individuals.

Host: Rana boyli.
Location: Lungs.
Locality: All stations in Butte County.
Type specimen: U. S. National Museum Helm. Coll. No. 8926.

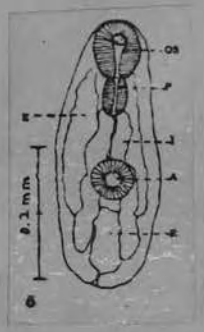
Shape in life bottle-like. Cuticle armed with spines posteriorly to the acetabulum; cuticle thickness varies from 8.8μ anteriorly to 2μ posteriorly. Length averages 7.4 mm. and varies from 3.2 mm. to 10 mm. Width averages 1.3 mm. and varies between 0.7 mm. and 2.2 mm. Oral sucker subterminal averages 0.33 mm. in length by 0.46 mm. in width; it ranges from 0.18 mm. to 0.14 mm. and from 0.29 mm. to 0.47 mm. respectively. Pharynx averages 0.22 mm. in length by 0.21 mm. in width. Esophagus about twice as long as pharynx. Caeca extend to posterior end of hind testis. The distinct "collar" visible between the pharynx and the oral sucker may be a part of the nervous system. Acetabulum located in first half of body and smaller than oral sucker; it averages 0.26 mm. in length by 0.31 mm. in width; it ranges from 0.15 mm. to 0.36 mm. in length and 0.24 mm. to 0.37 mm. in width. Ratio of length of oral sucker to acetabulum is 1:0.7, and range of variation of this ratio is 1:0.8 to 1:0.6. Average ratio of oral sucker to pharynx is as 1:0.55. Ovary kidney-shaped, never lobed; averages 0.44 mm. in length by 0.32 mm. in width; its range varies from 0.26 mm. to 0.55 mm. and from 0.20 mm. to 0.37 mm. respectively; usually on right side. Seminal receptacle near ovary and posterior to acetabulum; it is very large. Testes nearly same size and shape; length averages 0.82 mm.; width averages 0.64 mm.; range from 0.45 mm. to 1.03 mm. and 0.48 mm. to 0.87 mm. respectively. Uterus runs posteriorly between testes; extra-caecally the folds may extend to anterior level of anterior testis on the same side as the ovary; on the opposite side they extend only half as far; it returns to anterior part of the body between the testes and has many folds anterior to the acetabulum. Genital pore is at level of posterior part of pharynx. Cirrus sac does not extend to acetabulum; a coiled tube and divided seminal vesicle are contained in it. Vitellaria lateral and dorsal to caeca; extend across dorsal region anterior to ovary; seventeen groups were counted in one young fluke. Eggs operculate, brown with completely formed miracidia when laid; average 27μ by 14μ; range 25μ to 30μ and 11μ to 17μ for length and width respectively.

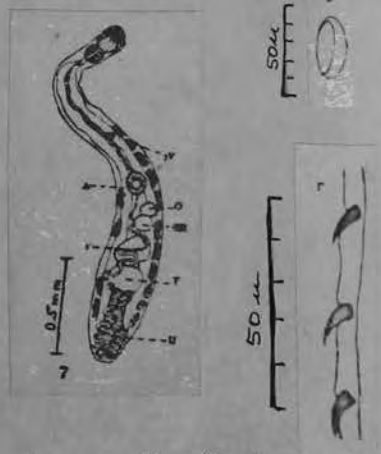


Haematoloechus buttensis may be separated from other species of this genus by a combination of characteristics. It differs from *H. kernensis* Ingles and *H. floedae* Harwood in having a different ratio for the oral sucker and the acetabulum. It may be separated from *H. similiplexus* Stafford by having smaller eggs and larger testes. The vitellaria are also differently distributed. Among other things the shape of the ovary serves to separate it from both *H. breviplexus* Stafford and *H. parviplexus* Irwin. The less extensive extra-caecal folds of the uterus serve to differentiate it from both *H. nievae* Travassos and Artigas and *H. longiplexus* Stafford. The presence of extra-caecal folds mark it as an *Haematoloechus* and not an *Ostiolum*.

Plagiorchiidae

Haematoloechus coloradensis (Cort, 1915)





FIGS. FROM CORT (1915)

Haematoloechus combesi n. sp. Batchvarov & Bourgat, 1974

HÔTE : *Conraua derooi* Hulselmans, 1971.

HABITAT : Poumons.

LOCALITÉ : Klouto (Togo).

MATÉRIEL DE DESCRIPTION : 4 exemplaires.

Description.

CORPS :

Corps allongé, aplati dorso-ventralement (fig. 1). Le premier tiers de l'animal est rétréci ; il est séparé du reste du corps par une sorte d'épaulement correspondant à la terminaison antérieure des boucles extracaecales de l'utérus. Cette disposition donne à l'espèce un aspect très caractéristique.

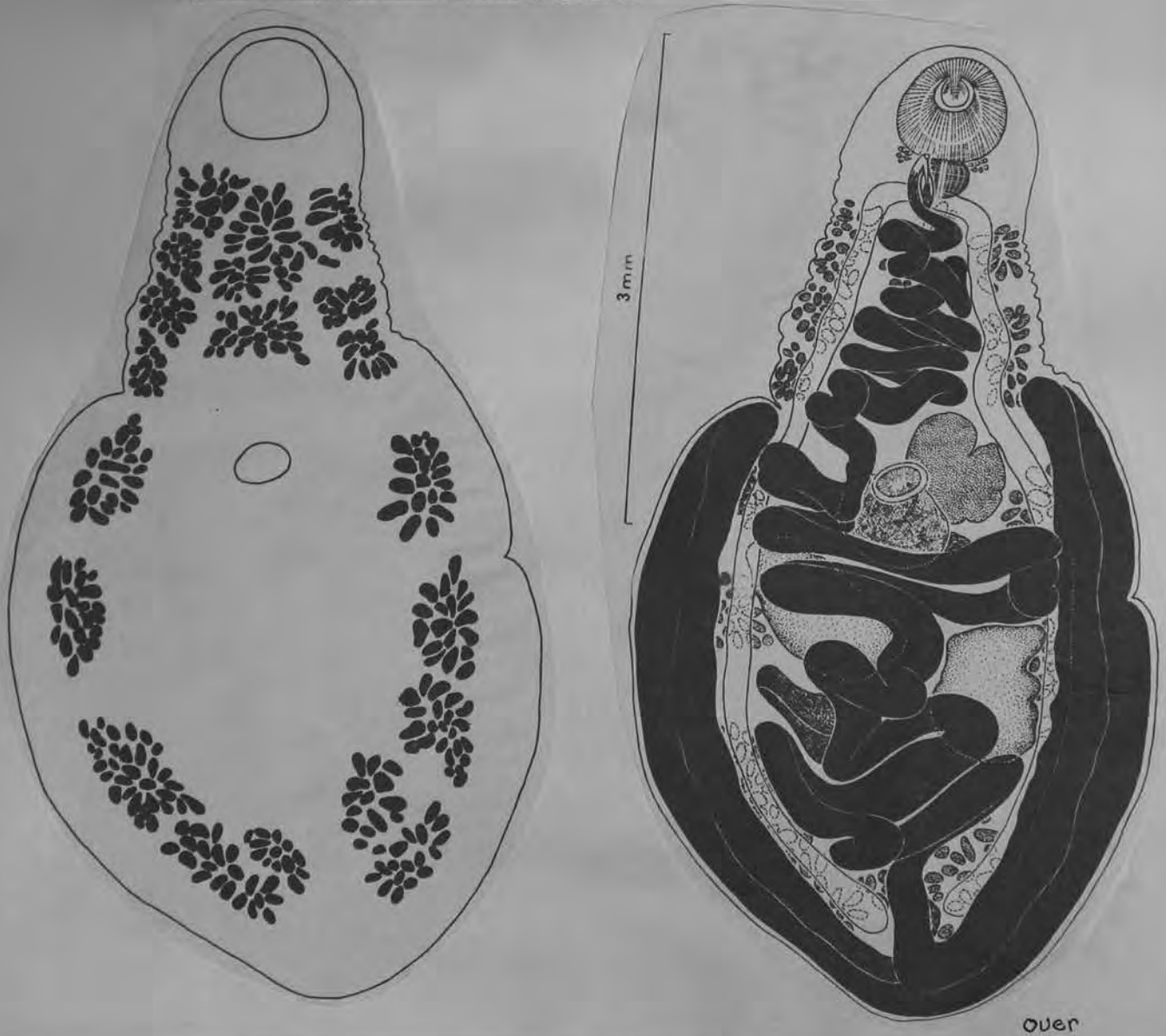
Les dimensions sont les suivantes :

— longueur : 5,2 à 6,1 mm ;

— largeur maximale : 2,8 à 3,3 mm.

TÉGUMENT :

Tégument mince (4,8 µ), sans aucune trace de spinulation.



over

VENTOUSES :

Ventouse orale subterminale-ventrale, diamètre : 0,515 à 0,570 mm.

Ventouse ventrale située un peu en avant de la mi-longueur du corps ; diamètre : 0,170 à 0,230 mm.

Rapport ventousaire VO/VV : 2,7 environ.

Distance entre centres des ventouses : 1,674 mm.

Si la ventouse orale est fortement développée, l'acétabulum en revanche est très discret, quasi dépourvu de musculature, et ne paraît guère fonctionnel.

APPAREIL DIGESTIF :

Bouche donnant accès à un pharynx sub-sphérique mesurant 0,205 à 0,243 mm de diamètre ; rapport VO/Ph : 2,5 environ. De part et d'autre de la région antérieure du pharynx existent deux petits amas glandulaires.

Œsophage non discernable.

Caecums longs, se terminant près de l'extrémité postérieure du corps, contenant du sang en voie de digestion.

APPAREIL REPRODUCTEUR MÂLE :

Testicules intercaecaux, disposés en diagonale, post-acétabulaires. Leur forme épouse la place disponible entre les circonvolutions de l'utérus et apparaît comme légèrement lobée. Le testicule antérieur mesure environ 0,70 sur 0,58 mm, le testicule postérieur 0,95 sur 0,48 mm. Vésicule séminale masquée par l'utérus, aboutissant à une poche du cirre très réduite située au niveau du bord postérieur de la ventouse orale. La poche du cirre comprend une vésicule séminale interne et des cellules prostatiques ; elle débouche au pore génital commun.

APPAREIL REPRODUCTEUR FEMELLE :

Ovaire intercaecal, para-acétabulaire, latéral, irrégulièrement mais profondément lobé. Il mesure environ 0,56 sur 0,60 mm.

Réceptacle séminal immédiatement post-acétabulaire, subsphérique, presque aussi grand que l'ovaire.

Glande de Mehlis dorsale au réceptacle séminal, très développée.

Vitellogènes organisés en rosettes, elles-mêmes formées de follicules bien distincts. L'extension des vitellogènes recouvre celle des caecums digestifs ; leur disposition précise est représentée sur la figure 2.

Utérus comprenant une branche descendante et une branche ascendante formant toutes deux des circonvolutions puissantes et nombreuses. Les boucles utérines extracaecales, caractéristiques du genre *Haematoloechus*, sont ici particulièrement développées ; elles remontent en avant de l'acétabulum jusqu'au niveau du bord antérieur de l'ovaire et sont responsables, comme nous l'avons souligné, de la silhouette particulière de l'animal. L'utérus aboutit au pore génital commun, au niveau du pharynx.

Oeufs brun clair à brun très sombre, à clapet visible, extrêmement nombreux, mesurant 0,022 sur 0,017 mm.

Discussion.

Par l'ensemble de ses caractères, le Trématode Digène que nous avons décrit prend place dans la famille des *Haematoloechidae* Odening, 1964. La présence de deux ventouses et de boucles utérines extracaecales permet de le ranger dans le genre *Haematoloechus* Looss, 1899.

Actuellement, quatre espèces appartenant à ce genre sont connues sur le continent africain (1) ; nous les indiquons ci-après avec leurs caractères essentiels :

H. exoterorchis Rees, 1964, chez *Dicroglossus occipitalis* au Ghana :

VO/VV = 0,75 ; ovaire régulier, testicules extracaecaux et fortement lobés ; boucles utérines extracaecales très réduites (entièrement post-testiculaires) ; vitellogènes s'étendant en arrière des testicules.

H. micrurus Rees, 1964, chez *Dicroglossus occipitalis* au Ghana :

VO/VV = 2,0 ; ovaire régulier ; testicules intercaecaux, allongés et non lobés ; boucles utérines extracaecales très longues remontant très en avant de l'acétabulum ; vitellogènes s'étendant en arrière des testicules ; présence d'un petit appendice postérieur.

(1) La présence en Afrique de *Haematoloechus variegatus* (Rudolphi, 1819), Looss, 1899, ne nous paraît pas devoir être considérée comme certaine.

continued next page-

Haematoloechus combesi Batchvarov and Bourgat, 1974
continued --

H. darcheni Combes et Knoepffler, 1967, chez *Conraua crassipes* au Gabon :

VO/VV = 4,0 ; ovaire très fortement lobé ; testicules intercaecaux et légèrement lobés ; boucles utérines extracaecales atteignant le niveau des testicules ; vitellogènes s'étendant en arrière des testicules.

H. lobogonadus Meskal. 1970, chez *Rana angolensis* en Ethiopie :

VO/VV = 2 ; ovaire lobé ; testicules intercaecaux et fortement lobés ; boucles utérines extracaecales atteignant le niveau des testicules ; vitellogènes ne s'étendant pas en arrière des testicules.

Nos exemplaires se distinguent des espèces précédentes par l'ensemble des caractères suivants :

VO/VV = 2,7 ;

Ovaire lobé ;

Testicules intercaecaux et faiblement lobés ;

Boucles utérines extracaecales dépassant antérieurement le niveau de l'acétabulum ;

Vitellogènes s'étendant en arrière des testicules.

On peut ajouter que la forme de nos exemplaires, marquée par un épaulement au niveau du rebroussement des boucles utérines extracaecales, n'existe pas chez les autres espèces.

Les affinités les plus étroites paraissent s'observer avec *H. darcheni*, également parasite d'un *Conraua*, mais *H. darcheni* possède un rapport ventousaire plus élevé, un ovaire beaucoup plus lobé et des boucles utérines extracaecales presque moitié moins longues.

Haematoloechus complexus (Seely, 1906) Krull, 1933

Worms elongated, 1.5 to 5.2 mm., attenuated anteriorly and bluntly rounded posteriorly; depressed posteriorly from level of acetabular zone. Cuticula thick and spineless in mature specimens. Oral sucker subterminal, 270 u in diameter in a 2.85 mm. specimen. Prepharynx not evident; pharynx 148 long and 125 wide; ratio of diameter of oral sucker to that of pharynx 2: 1. Esophagus short; ceca extending to near posterior end of body. Acetabulum large, 210 u in diameter in above specimen. Ratio of oral sucker to that of acetabulum, 4: 3. Testes irregular, slightly lobed in living specimens, placed obliquely in posterior third of body; in the above specimen, anterior testis etc. Cirrus pouch long and tubular, extending from pharynx to near acetabulum; its course undulating or straight. Genital pore submedian, ventral, and at level of pharynx. Ovary irregularly oval, sometimes slightly lobed and irregular; at level of and lateral to acetabulum. Seminal receptacle median, smaller than ovary and at same level. Mehlis' gland median at level of posterior border of acetabulum. Uterus extending anteriorly a short distance, then turning and extending to posterior end of body, turning anteriorly again, this ascending branch extending nearly the entire length of body, and terminating in a short metraterm which opens at genital pore; entire uterus intercecal, both descending and ascending branches thrown into short transverse folds. Vitellaria consisting of 18 to 22 clusters of large follicles extending from intestinal bifurcation to near posterior end of body in 2 dorso-lateral rows; 2 to 4 clusters median and anterior to acetabulum and 8 to 12 clusters anterior to acetabulum. Eggs average 30 by 19 u.

Ist intermediate host: Pseudosuccinea columella
2ond " " : dragonflies: Sympetrum vicinum, Pachydiplax longipennis and Holotania (Libellula) insecta

Final hosts: Rana pipiens, Rana clamitans

Life history similar to that of other frog lung flukes, except there are long sensory hairs on the body of the cercaria of H. complexus, different distribution of the metacercariae in the dragonfly and a loss of cuticular spines during the growth of the fluke in the final host.

6. *New hosts for* HAEMATOLOECHUS COMPLEXUS (*Seely*, 1906) *Krull, n. comb.* WENDELL H. KRULL.

Rana clamitans has been found to be a new host for *Haematoloechus complexus*. The snail *Pseudosuccinea columella* Say, has been determined as a first intermediate host, and the dragonflies, *Sympetrum vicinum, Pachydiplax longipennis* and *Holotania (Libellula) incesta*, have been determined as second intermediate hosts of this parasite. The snail and the dragonfly, *H. (L.) incesta* have been raised from eggs and infected in the laboratory. (Details of the life history are being published elsewhere.)

Haematoloechus confusus Ingles, 1932

Length over four times width; spines present all over body; ratio of oral sucker to acetabulum 4:3; field of the genital glands without vitellaria about 1/3 body length; Ovary and testes irregular in form and lobed; few vitellaria between the intestinal ceca;; eggs average 26x15μ; from lungs of Rana aurora draytonii from Oakland, Calif.

Most like H. complexus, agreeing in size, type of uterus, lobed testes and ovary; and in sucker ratio. It differs in having spines, in smaller eggs, in arrangement of vitellaria and in testes and ovary always being lobed.

Rapport ventousaire diamétral VO/VV exactement égal à 4/1 pour tous nos exemplaires.

APPAREIL DIGESTIF :

Bouche au centre de la ventouse antérieure. Pas de prépharynx. Pharynx important mesurant de 0,171 à 0,181 mm de longueur sur 0,154 à 0,165 mm de diamètre transversal. Rapport VO/Ph égal à 2,3/1 environ. Œsophage court (0,220 mm environ). Caecums longs et sinueux, se terminant très près de l'extrémité postérieure du corps. Ils sont bourrés de globules sanguins de l'hôte.

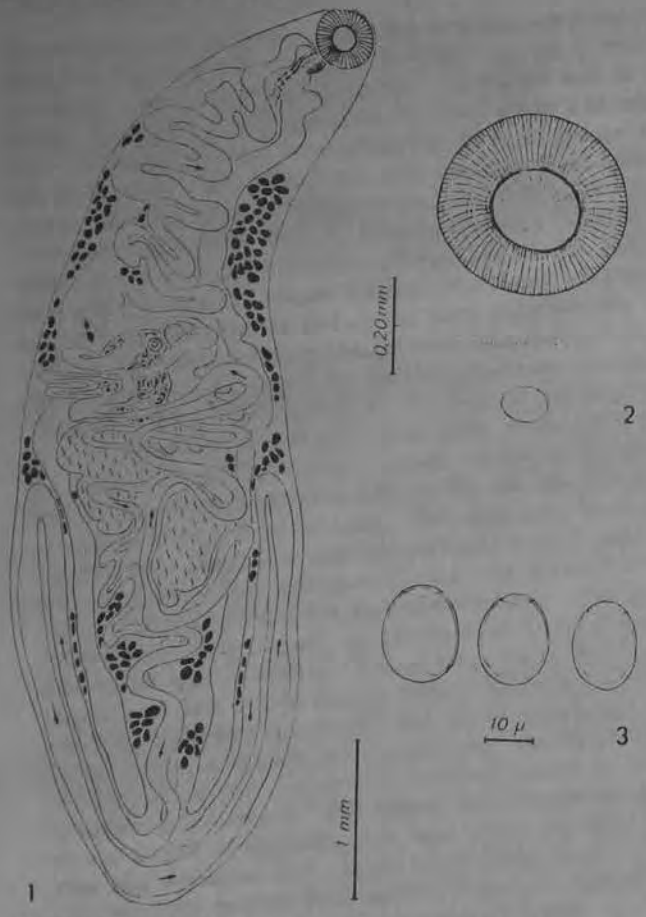


Fig. 1. — *Haematoloechus darcheni n. sp.* Animal *in toto*. Vue ventrale.
Fig. 2. — *H. darcheni*. Détail de la ventouse orale (en haut) et de l'acétabulum (en bas), à la même échelle.
Fig. 3. — *H. darcheni*. Aspects les plus habituels des œufs mûrs.

APPAREIL REPRODUC

Testicules dis
laire. Forme irrégu
corps. Le testicule
0,610 mm de large
Canaux déférents
à l'extrémité posté
butant au niveau d
Poche du cirre tul
bouche au pore gé
bord antérieur du

APPAREIL REPRODUC

Ovaire situé u
est formé d'une sé
sorte que le bord
au nombre de 5 à
l'axe du corps : 0,
sur le bord intern
Réceptacle séminal
voisines de celles c
Glandes de Mehlis
dorsalement par ra

Vitellogènes o
tuelle aux *Haemato*

Utérus compre
dante qui forment
du corps, il existe
vers l'avant jusqu'a

Œufs (fig. 3) : l
de plus en plus son
assez bien visible. I

Par l'ensemble
venons de décrire s
ning, 1964.

From: CLAUDE COMBES and L-P. KNOEPFFLER, 1967

SEE REPRINT

HAEMATOLOECHUS FLOEDAE, new species Harwood, 1932

PLATE 1, FIGURE 7

Specific diagnosis.—Haematoloechus: Flukes of medium size; the body is elongate, flattened, pointed toward the anterior end but rounded behind. The largest specimen in my possession is 10 mm long; the average, however, are about half that long. The smallest specimen measures 4.4 mm and seems to be fully mature. The width varies from 1.2 to 1.6 mm. The cuticula is smooth and entirely without spines. It is extremely thin, never being more than 4μ in thickness. The large oral sucker measures 3.6 to 4.4 mm in diameter. The ratio between the oral sucker and the pharynx is nearly as 1:2, but the pharynx is often a little smaller; however, the ratio does not fall below as 2:5. The ratio of the oral sucker to the acetabulum falls very close to as 1:3. The acetabulum is only slightly anterior to the middle of the body. In a worm measuring 5.4 mm long the acetabulum is 2.4 mm from the anterior end.

males - 3;
V. S - 1

The esophagus in properly expanded specimens is somewhat longer than the pharynx. The wide ceca extend to the posterior end of the body. The ovary lies beside the acetabulum and is irregularly lobed. It is 0.65 to 0.83 mm in length and 0.32 to 0.45 mm in width. The vitellarian follicles are arranged in 19 to 24 groups of irregular size and shape. It is difficult to count the individual follicles in each group, but they seem to range from 1 to 2 dozens. The uterus is arranged much like that of *Haematoloechus parviplexus* Irwin. There are a few loops at the anterior end of the ovary, then the uterus turns caudad, passes between the testes, and after a series of loops in the posterior end of the body there are the usual longitudinal folds outside the intestinal ceca, and then the uterus follows the same route cephalad to the genital pore in the pharyngeal region. There is a little difference in the lengths of the longitudinal folds in my material. They may extend only to the cephalic border of the posterior testis or to the cephalic border of the anterior testis. Not infrequently the uterine fold on the ovarian side of the body is somewhat shorter than its mate. The eggs vary from 21μ by 17μ to 17μ by 13μ. The testes are oval elongate bodies, somewhat irregular in outline. Not infrequently they are pointed at the anterior end. The two overlap for half their length. The posterior testis is usually slightly larger. It measures 0.8 to 1.2 mm in length and 0.34 to 0.7 mm in width. The anterior testis is 0.7 to 1.1 mm in length, and 0.32 to 0.65 mm in width. The size of the testes shows but very little correlation with the size of the worm. The distance of the posterior testis from the posterior end varies too much to be of any use as a character. The seminal vesicle is a large oval sac lying beside the ovary. The genital field is approximately two-fifths of the length of the body, but here again the variation is so great that the character must be of very doubtful use. In a worm 5.5 mm long the genital field measured but 1.8 mm, while in a worm 5.25 mm long the genital field measures 2.2 mm.

Hosts.—Rana catesbeiana and *R. clamitans*.

Habitat.—Lung.

Locality.—Houston, Tex.

Type specimen.—U.S.N.M. Helm. Coll. No. 30879.

Remarks.—This species most closely resembles *Haematoloechus parviplexus* Irwin, but it may be distinguished from that form by the smaller pharynx, the larger acetabulum, the smooth cuticula, the smaller egg, and the longer longitudinal folds of the uterus. *H. breviplexus* also has a smooth cuticula, but in this species it is exceptionally thick, whereas in *H. floedae* it is very thin. The present species also differs from *H. breviplexus* in size, relatively smaller acetabulum, and the unlobed testes.

Haematoloechus formosus (Pratt, 1903)
syn. Ostiolum formosum Pratt, 1903

"Ostiolum formosum Pratt after Pratt" From Pratt, 1902

Haematoloechus freitasi n. sp. Mañé-Garzón and Gil, 1953

(Figs. 1, 2 y 3)

Cuerpo fusiforme con la extremidad anterior más delgada, mide de 10,284 mm a 13,94 mm de largo por 1,689 mm a 2,361 mm de ancho a nivel del testículo anterior y 2,142 mm a 3,569 mm a nivel del testículo posterior, que es la parte más ancha del cuerpo.

La cutícula está cubierta de delgadas y pequeñas espinas.

La ventosa oral es sub-terminal, midiendo de 0,309 mm. a 0,500 mm de largo por 0,332 mm a 0,557 mm de ancho. El acetábulo, que mide de 0,357 mm a 0,787 mm de largo por 0,656 mm a 0,476 mm de ancho, está localizado aproximadamente en la unión del tercio anterior con el tercio medio, a nivel o un poquito por delante del polo anterior del ovario y de la espermateca. La relación ventosa oral: acetábulo varía de 1:2,2 a 1:1,4 con un valor promedio de 1:1,75.

La faringe es musculosa con 0,1438 mm a 0,262 mm de largo. El esófago es de la misma longitud que la faringe o apenas más largo. Los ciegos son largos alcanzando casi la extremidad posterior. En algunos ejemplares en el tercio anterior del cuerpo, por delante del ovario, los ciegos forman mu-

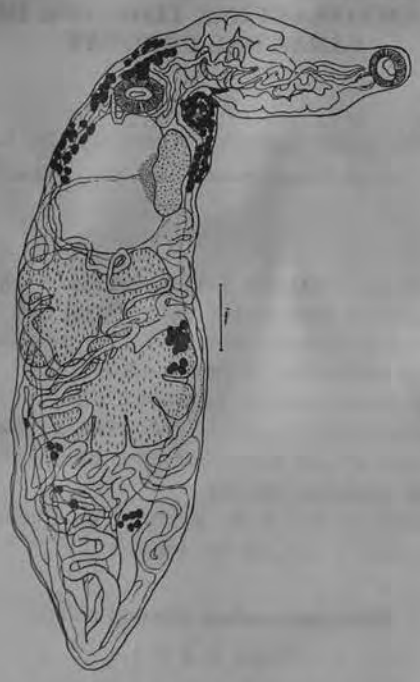


FIG. 1: *Haemotoechus freitasi* n. sp.

chos y apretados bucles de grueso calibre. El vitelógeno formado por gránulos de regular tamaño la mayoría extracecales. Existen cecales e intracecales. Los extracecales son los más abundantes; los anteriores, sobrepasan adelante del ovario escasamente un milímetro. De ahí descienden compactos hasta el nivel del testículo posterior. En esta porción son muy escasos los intracecales y unos pocos los cecales. Por debajo del testículo posterior se observan tres o cuatro grupos de gránulos semiocultos por las ansas uterinas.

El poro genital es parafaringeo. La bolsa del cirro es intra-

cecal, muy espiralada, delgada y no pasa más atrás de la barrera del acetábulo, espermateca y ovario. Los testículos son grandes, irregulares, intracecales, lobulados con escotaduras muy profundas y finas. El testículo anterior mide de 1,071 mm a 1,189 mm de largo por 1,2614 mm a 2,5258 mm de ancho. El testículo posterior mide de 1,091 mm a 2,296 mm de largo por 1,132 mm a 2,132 mm de ancho. El ovario alargado suavemente escotado, anterior a los dos testículos, sobre o al lado de la espermateca mide de largo 0,851 mm a 1,443 mm y de ancho de 0,309 mm a 0,656 mm. Es intracecal. La espermateca bien desarrollada discoide, de bordes lisos, ocupa la zona que queda entre el acetábulo y el testículo anterior, siendo casi enteramente intracecal. Mide a lo largo de 1,023 mm a 1,54 mm y a lo ancho 0,952 mm a 1,800 mm. La glándula de Mehlis está en el área de la espermateca. El útero parte del ovario atravesando transversalmente u oblicuamente el área de la espermateca descendiendo entre y por delante de los dos testículos formando pocas ansas casi totalmente intracecales. Por debajo del testículo posterior se forman muchas ansas transversales intracecales que terminan descendiendo en el extremo terminal por un ansa vertical que de allí remonta extracecalmente alcanzando la zona testicular, para descender paralela a la ascendente hasta el extremo terminal y de allí ascender por el otro lado del cuerpo también extracecalmente pero con ansas transversales, llegar al área del ovario o sus proximidades y de allí atravesar entre la espermateca y el testículo anterior para seguir ascendiendo intracecalmente y con finas ansas hasta el poro genital.

Los huevos son operculados midiendo de 0,0215 mm a 0,0232 mm a lo largo por 0,01505 mm a 0,0112 mm a lo ancho.

Habitat: pulmón de *Leptodactylus occellatus* (L.). 15 ejemplares. Bañado Tropa Vieja, departamento de Canelones, Uruguay.

Plagiorchiidae

Haematoloechus fuelleborni (Travassos and Darriba, 1930)
syn. Pneumonoeces fuelleborni Travassos and Darriba, 1930

17. Haematoloechus fuelleborni (Travassos & Darriba)

1930 *Pneumonoeces fuelleborni* Travassos & Darriba. Mem. Inst. Oswaldo Cruz. Janeiro, 23 5:250; Fig. 30. — Terra typica: São Paulo (Wirt: *Bufo* sp. Typus: Nr. 6613, Col. helmintol., Inst. Oswaldo Cruz. Rio de Janeiro).

Diagnosis (nach Travassos & Darriba): Körper langgestreckt keulenförmig, Vorderende etwas verjüngt, 10 mm lang und 2,3 mm breit; Cuticula glatt; Ösophagus kurz; Größenverhältnis MSN:BSN:Pharynx etwa 2:1:1; BSN hinter der Körpermitte gelegen; Cirrusbeutel-Basis kurz vor BSN, Genitalporus auf der Höhe des Pharynx; Testes länglich, glattrandig diagonal hintereinander gelegen; Ovarium länglich, seitlich hinter dem

FROM ODENING, 1960

Pneumonoeces fuelleborni n. sp. Travassos & Darriba, 1930

(Est. LXXI, fig. 30)

Desta especie apenas obtivemos um exemplar, mas é tão caracteristica que permitte uma bôa definição.

Comprimento 10 mm.; largura 2,3 mm. Cuticula lisa. Corpo claviforme com a maior largura post-equatorial. Acetabulo bem desenvolvido, equatorial, mede 0,31 mm. de diametro longitudinal por 0,37 mm. de diametro transversal. Ventosa oral sub-terminal, grande, mede 0,67 mm. de diametro. Pharynge logo em seguida á ventosa oral, forte, mede 0,30 mm. de diametro. Esophago relativamente curto. Cecos longos e pouco largos, estendem-se até a extremidade posterior do corpo. Póro genital na zona do pharynge; bolsa do cirro muito longa e sinuosa contendo um cirro altido, prostata e longa vesicula seminal, estende-se até muito perto do acetabulo, isto é, até perto do meio do corpo. Testiculos alongados no sentido longitudinal, relativamente pequenos, post-equatoriaes, com zonas e campos em contacto; medem os testiculos respectivamente 0,57 e 0,71 mm. de comprimento por 0,57 e 0,42 mm. de largura. Ovario alongado longitudinalmente, lateral, parcialmente na zona acetabular, mede 0,81 por 0,50 mm. Espermatheca grande, mediana, parcialmente na zona do ovario, entre este e o testiculo anterior. Utero formando numerosas alças transversaes tanto na metade posterior como na metade anterior do corpo; o ramo descendente e o ascendente são completamente entrelaçados e difficeis de distinguir, as alças longitudinaes são muito reduzidas não attingindo nem a zona do testiculo posterior; o ramo ascendente fórma muitas alças transversaes que ultrapassam a area cecal. O conjuncto do utero lembra, quando observado com pequeno augmento, o typo observado no genero *Os'iolum*, mas não ha formação de grupos de alças transversaes descendentes e ascendentes como naquelle grupo. Vitellinos dispostos em dois grupos, um anterior e outro posterior, existindo porém muitos folliculos em todo o campo lateral mais ou menos occultos pelas alças do utero; anteriormente os vitellinos ficam muito abaixo da bifurcação intestinal intra e extra-cecaes; na parte media do corpo ficam sómente na area entra cecal e finalmente na parte posterior ficam em grande parte na area intra cecal, muito abaixo do testiculo posterior, mas acima da zona da terminação das alças longitudinaes do utero. Os ovos são como nas outras especies de côr escura quasi negra, operculados e medem de 0,032 a 0,039 mm. de comprimento por 0,016 a 0,021 mm. de maior largura.

1. *PNEUMONOECES ITURBEI* ~~n. sp.~~ Cordero and Vogelsang, 1939

(Figura 1)

Medidas, en milímetros:	L	l
Longitud (L) total aproximada. .	16,80	
Ancho (l) máximo.		1,47
Ventosa anterior.	0,36	× 0,33
Faringe.	0,21	× 0,21
Esófago.	0,20	
Ancho de los ciegos intestinales.		0,15
Ventosa ventral.	0	
Testículo anterior.	1,50	× 0,42
" posterior.	2,16	× 0,60
Ovario.	1,11	× 0,39
Vesícula seminal.	1,20	× 0,30
Huevos maduros en el útero. . .	0,028	× 0,012

El cuerpo es alargado, de tamaño grande, con los extremos relativamente agudos. La máxima anchura corresponde a la mitad posterior.

La cutícula es lisa y sin espinas.

La ventosa anterior es pequeña en relación con las dimensiones del cuerpo. La faringe es igual a tres quintos del diámetro del cotilo. La longitud del esófago es aproximadamente igual a la de la faringe. Los ciegos intestinales, que son de espesor moderado, no alcanzan al extremo posterior.

Falta la ventosa posterior o acetábulo.

Los testículos son elípticos, alargados—la relación entre sus dos ejes es igual a 3,6—de bordes lisos y enteros, son desiguales por su longitud, llegando el anterior a valer sólo siete décimos del posterior. Están colocados uno detrás del otro, el extremo anterior del primero coincide con el centro del cuerpo, estando separados entre sí por un espacio por lo menos igual a la mitad de su máximo ancho. No se perciben bien los deferentes, pero se puede ver bien la bolsa del cirro, situada entre la bifurcación del intestino y que es de extensión considerable.

El ovario, ovalado, entero y liso, es menor que el testículo anterior y ocupa junto con la vesícula seminal—que es algo más larga y menos ancha que aquél—parte del tercio anterior del cuerpo, entre ambas ramas intestinales, estando separados ambos, ovarios y vesícula seminal, del testículo anterior por un espacio igual a la longitud de éste. Los vitelógenos son típicamente extracecales y ocupan únicamente los tres quintos anteriores del cuerpo, llegando sólo al testículo anterior y formando de nuevo a diez grupos de folículos glandulares.

La disposición de las ansas del útero recuerda mucho a la de *Pn. parviplexus* Irwin, 1929. Los bucles uterinos descendentes forman en la faz dorsal a partir del ovario una serie de pliegues transversales apretados hasta alcanzar el testículo anterior, luego se disponen en ansas longitudinales cortas, tanto es que las extracecales posteriores sólo llegan hasta la mitad del nombrado testículo. La porción ascendente, que en la figura aparece en tinta negra, forma bucles a los lados de los órganos sexuales masculinos y luego se dispone en

over

pliegues transversales, que antes de llegar al poro genital efectúan en el cuello su trayecto recurrente.

Pneumonoeces iturbei n. sp. difiere de todas las especies del género por carecer de acetábulo, o sea, la ventosa ventral o posterior. *Pn. neivae* Travassos & Artigas, 1927, que tampoco posee esa ventosa, ofrece con la nueva especie grandes diferencias, a saber: sus dimensiones son menores y su forma más elíptica, los testículos son lobulados y pareados, los vitelógenos se hallan dispersos por todo el cuerpo y aparecen en el extremo posterior encuadrados por los bucles ascendentes de las ansas uterinas extracecales, que son muy largas y que llegan más acá del ovario.

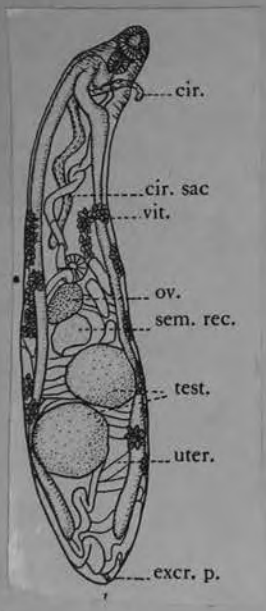
Hemos tenido presente dos ejemplares—uno de ellos con el extremo anterior truncado—que fueron recogidos en el pulmón de *Rana palmipes* Spix, en Maracay, Estado Aragua.

Cordero and Vogelsang, 1939

Plagiorchidae

Haematoloechus kernensis Ingles, 1932

Diagnosis: Rather long, slender worms; widest at the level of the testes; no spines; ratio of the acetabulum to the oral sucker about 1:1; ovary and testes not lobed; acini of the vitellaria large with 6 to 20 in a group; longitudinal folds of the uterus outside of the intestinal ceca not extending beyond the level of the posterior testis; eggs average 30 by 16μ; from lungs of Rana aurora draytoni from Bakersfield, Kern county, California.



Haematoloechus legrandi — sp. Maté, Sarjmand & Gil, 1959

Como de esta especie encontramos un solo ejemplar e incompleto, respecto de la forma total del cuerpo, podemos decir nada más que la extremidad anterior está adelgazada, angostándose suavemente a partir casi del límite anterior de los vitelógenos. El fragmento que poseemos mide 0,232 mm. de largo por 1,378 mm. de ancho a nivel del acetábulo. La cutícula es lisa. La ventosa oral sub-terminal mide 0,426 mm. de largo por 0,394 mm. de ancho. El acetábulo mucho más pequeño que la ventosa oral mide 0,231 mm de largo por 0,259 mm de ancho, es decir con eje mayor orientado oblícuamente, casi transversalmente, y situado inmediatamente por delante del complejo ovario-espermateca, separado de esta última por un ansa uterina. La relación ventosa oral-acetábulo está en la

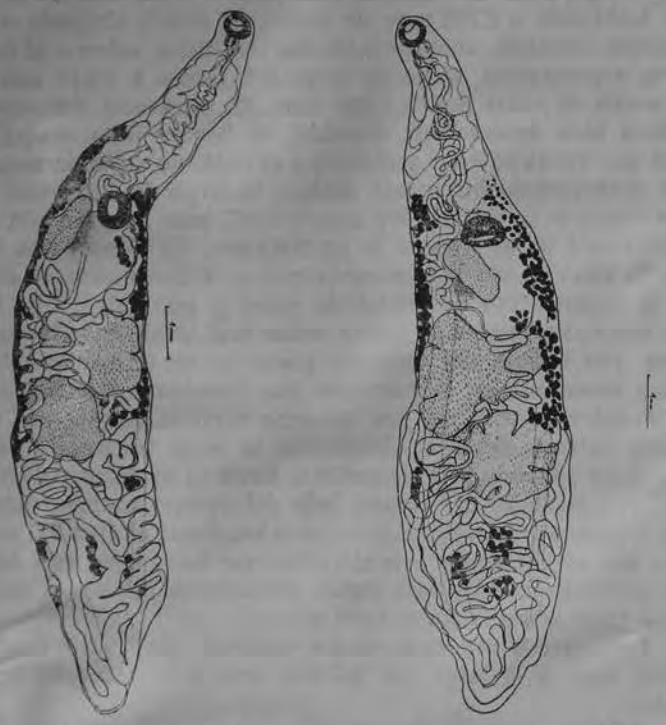


Fig. 2. — *Haematoloechus freitasi* n. sp.
Fig. 3. — *Haematoloechus freitasi* n. sp.

razón de 1:2,8. No existe prefaringe. La faringe es poderosamente musculosa, con 0,229 mm de ancho por 0,181 mm de largo. El esófago tiene escasamente más longitud que la faringe. Los ciegos son largos y seguramente han de llegar a la extremidad posterior. El vitelógeno en la parte anterior llega a casi un milímetro de la bifurcación cecal, y sobrepasan por detrás al testículo posterior. La mayor cantidad se dispone extracecal y cecalmente, pero en la parte preacetabular invaden en regular cantidad el área intracecal. El poro genital es parafaríngeo inferior. La bolsa del cirro es intracecal, poco

sinuosa, delgada, quedando a casi 2 mm por delante del acetábulo. Los testículos son redondeados bastante regulares, intracecales completamente. El testículo anterior mide 0,656mm. por 0,492 mm y el posterior 0,623 mm por 0,492 mm. Ambos se colocan oblícuamente uno del otro, y quedan por detrás de la espermateca y del ovario. Este último de forma arriñonada y colocado a la derecha de la espermateca mide 0,705 mm de largo por 0,361 mm de ancho. Es casi enteramente intracecal. La espermateca discoide mide 0,768 mm de largo por 0,307 mm de ancho. Los cuatro elementos, los dos testículos, el ovario y la espermateca son de tamaño bastante parecido. La glándula de Mehlis está dentro del área de la espermateca. El útero parte del ovario hacia abajo dejando muy corto trayecto en el área de la espermateca, dirigiéndose hacia la extremidad posterior pasando entre el testículo posterior y el ciego izquierdo. Por detrás de los testículos las circunvoluciones uterinas son apretadas y numerosas tanto intra como extracecalmente; ascendiendo por el lado derecho y por el centro, cubriendo en parte al testículo anterior y a la espermateca para seguir hacia adelante haciendo muchas vueltas, para finalmente terminar en el poro genital junto al ángulo inferior derecho de la faringe. Los huevos son operculados midiendo 0,03 mm de largo por 0,012 mm de ancho. Habitat: pulmón de *Leptodactylus ocellatus* (L.). Dedicamos esta especie al director del Museo Nacional de Historia Natural de Montevideo, señor C. Diego Legrand.

Discusión: Recientemente Dobbin (1957) estudia las especies del género *Haematoloechus* señaladas en Sudamérica, que son siete: *H. neivai* (Travassos y Artigas, 1927), *H. fuelleborni* (Travassos y Darriba, 1930), *H. lutzi* (Freitas y Lent, 1939), *H. ozorioi* (Freitas y Lent, 1939), *H. iturbei* (Cordero y Vogelsang, 1939). Con estas dos nuevas especies que hoy describimos del pulmón de *Leptodactylus ocellatus* (L.) se eleva, pues, a siete las especies conocidas de este género para Sudamérica, para las cuales proponemos, de acuerdo con J. F. Teixeira de Freitas (Comunic. pers.), la siguiente clave:

1. ACETÁBULO AUSENTE
   - A. Cutícula lisa ..... *H. neivai*
   - B. Cutícula con espinas ..... *H. iturbei*
2. ACETÁBULO PRESENTE
   - A. Acetábulo y ventosa oral casi iguales . *H. lutzi*
   - B. Acetábulo mayor que la ventosa oral .
     - b) cutícula lisa ..... *H. ozorioi*
     - bb) cutícula con espinas ..... *H. freitasi*
   - C. Acetábulo menor que la ventosa oral
     - c) bolsa del cirro muy larga... *H. fuelleborni*
     - cc) bolsa del cirro corta..... *H. legrandi*

- OVER -

Haematoloechus lobatus (Seno, 1907) Walton, 1948

Haematoloechus lobatus was first described by Seno in 1907 on the specimens from *Rana nigromaculata* of Japan, but his description was insufficient to the morphology and locality of the species. An attempt was made to redescribe *H. lobatus* based on the specimens collected from bull-frogs, *Rana catesbiana*.

Materials and Methods

Twenty one mature and 5 immature specimens of a species of trematode belonging to the genus *Haematoloechus* were obtained from 15 bull-frogs, *Rana catesbiana*, captured in Chiba prefecture and at Takamatsu city in Kagawa prefecture, Japan. Morphological examination was made on the mounted specimens after fixed with 70% alcohol and stained with Heidenhain's haematoxylin or carmine. All figures were drawn with the aid of the camera lucida.

Description of the species

Haematoloechus lobatus (Seno, 1907)
Walton, 1948

Host: Bull-frog, *Rana catesbiana*
Habitat: Lung
Locality: Chiba prefecture and Takamatsu city in Kagawa prefecture, Japan
Specimens: Neotype deposited in the Meguro Parasitological Museum; Coll. No. 19176; Paratype in the author's collections

Body is ellipsoid in shape and meaures 11.3–13.5 mm in length and 3.1–4.0 mm in breadth, with a maximum body width at the level of anterior testis. Cuticule has no spines on all the surface of body. Oral sucker is large, 0.4–0.7 mm in diameter and is about four times the width of acetabulum, being the ratio of pharynx to acetabulum 1.2–1.4 : 1. Acetabulum is situated at the junction of ovary and seminal receptacle at the level of anterior body, measuring 0.14–0.25 mm in diameter. Pharynx is usually round, 0.2–0.3 mm in diameter. Esophagus is short and bifurcates at the level of the anterior one-seventh of body. Caeca extend to the posterior end of body. (Figs. 1, 2, 3)

Testes are oval or elongated in shape, larger than ovary, and they are unlobed but may be slightly irregular in outline. Anterior testis is 0.88–1.25×0.58–2.5 mm in size and is smaller than posterior one being 1.5–1.68×0.57–0.75 mm in size; its distance from the posterior end of body is about one half of its own length. (Figs. 4, 7)

4

1

5

1-2 Young Adults
5 Ovarian complex

2

- over -

Ovary is situated at the side of acetabulum and the major portion of the former lies posterior to the latter. Ovary measuring 1.5–1.68×0.75 mm in diameter, is deeply and irregularly lobed with a distinctly "knobby" appearance; it is elongated and longer than the seminal receptacle which lies beside it. The long axis of seminal receptacle is parallel to that of the body, or only slightly oblique. The very voluminous seminal receptacle lies ventral to shell gland and beside ovary. (Figs. 5, 6)

Vitelline rosettes, being 16 to 19 in number, are arranged at irregular intervals along intestines from a short distance posterior to the intestinal bifurcation to the caecal termination. After running laterally for a short distance from ovary, uterus proceeds in the ventral side of body, twisting in the intercaecal region to the posterior end of body. Then uterus goes anterolaterally along the posterior margin of body to form an anterolateral loop of uterus on each side and backs again to the posterior extremity of body, from which it runs anteriorly in the dorsal side of body along the midline to form a series of the transverse loops winding up to the genital pore.

Embryonated eggs are very small, 17 to 20 μ long by 13 to 16 μ wide, elongated oval in shape and light brown in color.

Specific Diagnosis

The genus *Haematoloechus* Looss, 1899 (Syns. *Pneumonoeces* Looss, 1902; *Ostiolum* Pratt, 1903; *Pneumbites* Ward, 1917): Body 11.3–13.5 mm in length and 3.1–4.0 mm in breadth; more or less pointed posteriorly. Spine absent. Oral sucker 0.4–0.7 mm. Acetabulum very small, 0.14–0.25 mm in diameter. The ratio of oral sucker to acetabulum is 2.7–2.9:1, that of body to acetabulum is 3.4–3.6:1 and that of pharynx to acetabulum is 0.7–0.8:1. Ovary is lobed, 1.5–1.68×0.57–0.75 mm; receptaculum very voluminous; testes very prominent, the anterior one 0.88–1.25×0.58–2.5 mm and the posterior 1.25–3.13×0.58–1.68 mm in size. Eggs are oval, light brown, embryonated, 17–20×13–16 μ in size.

Host: Bull-frog, *Rana catesbiana*
Habitat: Lung
Locality: Chiba prefecture and Takamatsu city, Kagawa prefecture, Japan.

Discussion

The genus *Haematoloechus* was created by Rudolphi in 1819 based on the type species *H. variegatus* and is characteristic in the following features: the body is elongate, spinose or not; acetabulum small, situated in the anterior or middle third of body; genital pore ventral to pharynx or esophagus; ovary lobed or not, situated close to acetabulum; seminal receptacle is large and Laurer's canal is absent; uterus occupies all available space of the hind body as well as intercaecal field of the fore body and excretory vesicle is Y-shaped; eggs are very numerous, brown and embryonated. The species of the genus are parasitic in the lungs of amphibians.

H. lobatus is provided with these generic features and its related species can be discriminated from each other in the ratios of oral sucker to acetabulum and pharynx to acetabulum, in egg size, and in the morphology of the vitellaria, ovary, cuticular spine and uterus. *H. lobatus* was first described by Seno in 1907 and he distinguished it from *H. variegatus* only based on the morphology of the ovary, but he did not compared his species with the other related species of the genus.

The present examination revealed that the characteristics which distinguished *H. lobatus* from *H. variegatus* were found in the oral sucker-acetabulum and pharynx-acetabulum ratios, in egg size, and in the morphology of the vitellaria, cuticular spine, and uterus, in addition to the morphological feature of the ovary. Furthermore, *H. lobatus* was different from *H. sibiricus japonicus* in the size of the body, ovary, testis, egg, and vitellaria. Another related species, *H. nanchangensis major*, could be discriminated from *H. lobatus* in the ratio of oral sucker to acetabulum (Table 1) and in the morphology of the ovary, this organ being lobed in *H. lobatus*.

H. lobatus had been missed by most of previous authors because Seno (1907) described it briefly in Japanese.

The original figures of *H. lobatus* are shown in Figs. 7 and 8 of Plate 9 of his paper but Seno wrongly indicated that the figures were presented in Fig. 7 of Plate 1.

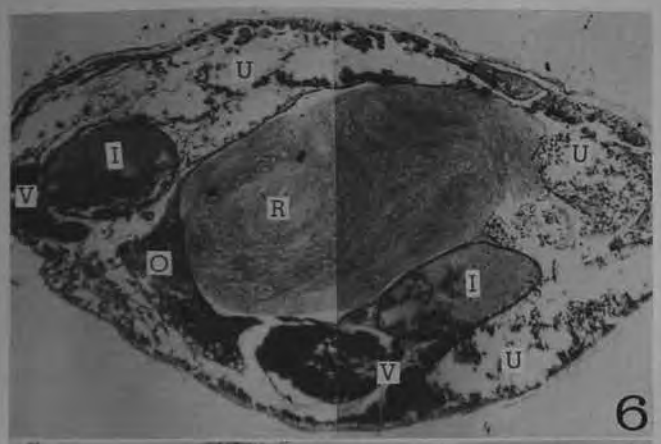
An attempt was therofore made to redescribe the species based on the specimens collected from bull frogs and to assign these specimens as the neotype of *H. lobatus* because the type specimen would be lost. *H. lobatus* was obtained by Seno from the lungs of frogs *Rana nigromaculata* and no other hosts have been recorded, so the bull-frog, *Rana catesbiana*, is added as a new host.

From Uchida and Itagaki, 1976

continued →

CONTINUED:

Haematoloechus lobatus (Seno, 1907) Walton, 1948



6 Section through seminal vesicle.

7 Section through anterior testis

Table 1 Comparison of the measurements (mm) of *Haematoloechus lobatus* with those of the related species

Species of fluke	*H. lobatus*	*H. lobatus*	*H. nanchangensis major*	*H. variegatus*	*H. variegatus*	*H. sibiricus japonicus*
Authors	Seno (1907)	The present authors	Yamaguti (1936)	Looss (1894)	Odening (1958)	Yamaguti (1936)
Body length (BL)	10.8	11.3 - 13.5	3.7 - 4.7	4.0	1.7	6.0 - 8.7
breadth	3.7	3.1 - 4.0	1.2 - 2.0	1.0 - 1.8	1.0	1.0 - 2.4
Oral sucker (O)	—	0.4 - 0.7	0.3 - 0.4	—	0.4 - 0.8	0.3 - 0.5
Acetabulum (A)	—	0.14 - 0.25	0.3 - 0.38	—	0.34	0.4 - 0.8
Pharynx (P)	—	0.2 - 0.3	0.1 - 0.17	—	0.22-0.23	0.15-0.23
O/A	—	2.7-2.9 : 1	4 : 1	—	1.2 -2.4 : 1	0.56-0.75 : 1
A/P	—	0.7-0.8 : 1	2.2-3.0 : 1	—	1.5 : 1	2.7 - 3.5 : 1
BL/A	—	3.4-3.6 : 1	2.4-4.9 : 1	(2.2 -4.0 : 1)	1.7 : 1	3.6 - 6.0 : 1
Testis anterior	—	0.88 - 1.25× 0.58 - 2.5	0.22 -0 .53× 0°28 -0 .58	—	0.34×1.19	0.3 - 0.7× 0.9 - 1.7
posterior	—	0.58 - 1.68× 1.25 - 3.13		—	0.58×1.13	
Ovary	—	0.57 - 0.75× 1.5 - 1.68	0.27 - 0.38× 0.5 - 0.65	0.18 -0.22	—	0.28-0.57× 0,65-1.0
Vitellaria	—	16-19	8-12	10-12	8-14	16-20
Eggs	—	0.017-0.020× 0.013-0.016	0.020-0.024× 0.036-0.039	0.015-0.017× 0.035-0.040	0.012-0.015× 0.025-0.028	0.015-0.021× 0.026-0.033
Spine	—	absent	absent	present	present	absent
Host	*R. nigromaculata*	*R. catesbiana*	*R. nigromaculata*	*R. esculenta*	*R. esculenta*	*R. nigromaculata*
Reported locality	Japan	Japan	Japan	Asia, U.S.A., Europe, Africa, (except Japan)	〃	Japan

From Uchida and Itagaki, 1976

Family: *Haematoloechidae* ODENING, 1964
Genus: *Haematoloechus* LOOSS, 1899
Subgenus: *Skrjabinoeces* SUDARIKOV, 1950.

Haematoloechus (S.) lobogonadus ~~n. sp.~~ MESKAL, 1970
(Text figs. 21 and 22; Pl. I fig. 5; Pl. II figs. 1 and 2; Pl. IV fig. 2)

Host: *Rana angolensis* (BOCAGE, 1866)
Habitat: Lungs

Description

General Morphology: The following description is based on a large number of live worms, 20 whole mounts and six sectioned specimens, all from R. Dima. Measurements of the internal anatomy are taken from large specimens (over 10,000 in length).

Number of Hosts		Intensity of infection				Locality	Date of collection
Inspected	Infected	Total number of worms	Load per host				
			Min.	Max.	Mean		
13	6	30	1	14	5	R. Dima	7.8.67
9	6	64	3	27	10.7	R. Dima	28.8.67
4	3	8	1	5	2.7	R. Dima	20.11.67
8	1	10	10	10	10	R. Gefersa	15.8.66
8	4	10	1	5	2.5	R. Tafo	8.7.66
52	3	3	1	1	1	R. Tafo	31.8.66
15	1	1	1	1	1	R. Tafo	6.5.67
9	3	3	1	1	1	R. Tafo	22.11.68

Body is large, elongate, dorso-ventrally flattened, anteriorly tapering and posteriorly gently rounded. Fully mature large specimens measure 12000—14554 (12968.5) in length and 3200—4060 (3615) in maximum width which is at the level of the anterior testis. Integument is thickly covered with well developed spines measuring up to 29 in length. Oral sucker is situated terminal to slightly subterminal ventral. It is well developed and measures 406—575 (508) long by 424—479 (459) wide. The size, position and state of development of the acetabulum varies with age of the animal. In juvenile forms it is fairly muscular and about half the size of oral sucker. But as the animal grows larger, the acetabulum becomes relatively smaller in size and less muscular, and because of the underlying egg-filled uterine loops it is practically invisible in unsectioned specimens. Position of acetabulum in juvenile animals is at the mid body, while in mature specimens it is at the hind end of the anterior third of body.

Digestive organs: Prepharynx is absent. Pharynx almost globular and well developed (Pl. II fig. 2) measuring 300—330 (309) in length and 300—320 (316) in width. It is surrounded by peripharyngeal gland cells whose secretion enters at the hind end of the pharynx. A short esophagus links the pharynx to the more dorsally placed intestinal bifurcation. Esophageal glands are present. Crura are simple and long extending post-testicularly to a short distance before the posterior end of the body. Post-cecal body 650—958 (852). Ceca almost always filled with blood meal. Live specimens kept in saline solution often regurgitate the intestinal content and die in less than 30 minutes.

Reproductive System: The male system is made up of two large and deeply lobed testes situated at tandem in the posterior half of the body. Slightly sinistral to the median line, the anterior testis measures 1400—2298 (1795) in length and 1000—1700 (1310) in maximum width. The posterior testis which is on the same side as the ovary measures 1900—2183 (2081) in length and 900—1800 (1585) in maxi-

—OVER—

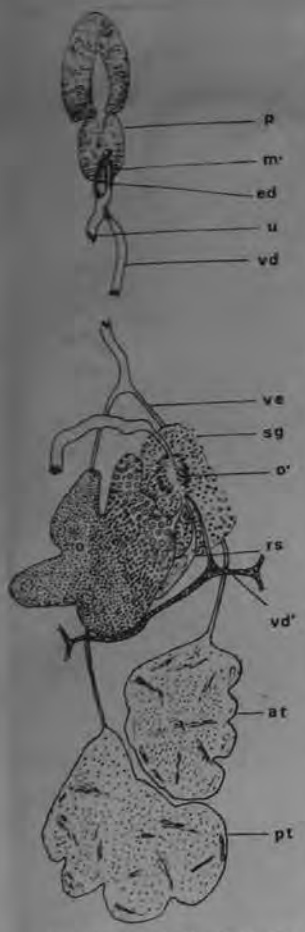


Fig. 22. Genitalia of *H. (S.) lobogonadus*

mum width. *Vasa efferentia* arising from the front ends of the testes extend anteriorly to just in front of the ovary where they converge to form a rather wide vas deferens. The latter extends forward along the median line up to just behind the intestinal bifurcation where it enters as a narrow muscular duct into a thin walled cirrus pouch. The latter turns ventrally across the uterus and extends forward to the anterior half of the pharynx where the ejaculatory duct opens into a common genital atrium (Pl. I fig. 5).

The ovary is large, irregular in shape and deeply lobed. It is situated just anterior to the mid body and slightly to the right of the median line. It measures 600—1600 (1116) in diameter. A short sinistral oviduct joins a canal from the *receptaculum seminis* on its way to a medially situated ootype. Another canal from a post-ovarially situated transverse vitelline duct opens into the ootype. The latter is immediately surrounded with Mehlis' gland secretion and outwardly with a large Mehlis' gland. A narrow uterus emerges anterior to the Mehlis' gland and curves around the ovary to descend on its right side. It makes several intercecal loops while descending to the posterior extremity of the body, whence it ascends extracecally up to the anterior level of the posterior testis only to descend again to the posterior extremity. Then it makes another extracecal loop up to the posterior end of the anterior testis and then ascends intercecally making several longitudinal loops which fill all available intercecal space. Anterior to the ovary the uterine loops are mainly transverse and intercecal. At the level of intestinal bifurcation the uterus joins a narrow, rather muscular metraterm that leads to the common genital atrium. The entire uterus is densely packed with innumerable eggs. The latter are small, yellowish and operculate measuring 22—25 (24) by 17—17.5 (17.3). Receptaculum seminis is about the same length as the ovary but much wider. It is situated just ventral to the ovary (Pl. IV fig. 2).

Vitellaria consist of regularly distributed clusters of grape-like vitelline follicles extending laterally from close behind intestinal bifurcation to the posterior half of the body. Vitellaria on the right side extend only up to the extracecal loop on its side or just anterior to the hind testis. The vitelline clusters in the left side are more numerous and extend to just behind the anterior testis or slightly behind the terminal end of the extracecal uterine loop on its side. In juvenile forms there are 5 to 10 clusters of vitelline follicles. Single follicles from one juvenile specimen measured 103—162 (127) long by 81—118 (101) wide.

Discussion

Historical: Cort (1915) noted that lung flukes from anurans were first reported by Zeder in 1800. According to him Rudolphi in 1819 described a lung fluke from *Rana esculenta* under the name *Distomum variegatum*. Looss (1894) gave an adequate description of the worm and later (1899) he proposed a new genus *Haematoloechus*. According to Cort "on account of Stahl's hemipteron genus *Haematolecha* established in 1874, Looss changed the generic name *Haematoloechus* to *Pneumonoeces*". Several species of lung flukes were described under this genus by such authors as Stafford (1902) from Canadian frogs, Cort (1905) from frogs and toads in U.S.A., Travassos and Artigas (1927) from South America and Travassos and Darriba (1930) from Mexico. Ingles (1932) indicated that the change made by Looss was not in accord with the recommendation of the International Rules of Zoological Nomenclature, and therefore restored the orig-

—CONTIN

inal name *Haematoloechus* and reduced *Pneumonoeces* to synonymy. HARWOOD (1932) simultaneously and independently suggested the retention of the generic name *Haematoloechus*.

FREITAS and LENT (1939) erected the subfamily *Haematoloecinae* (family *Plagiorchiidae*) for the genus. YAMAGUTI (1958) emended this subfamily name to *Haematoloechinae*. ODENING (1964) removed the subfamily from the family *Plagiorchiidae* and placed it under a newly created family *Haematoloechidae* with the diagnostic features of the subfamily.

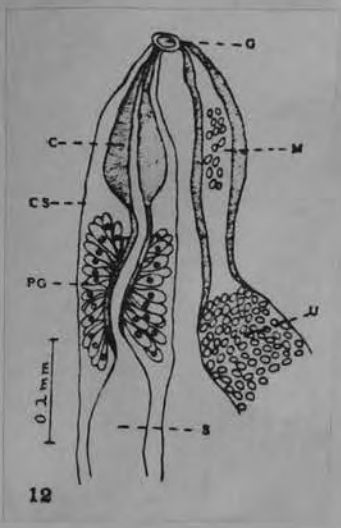
Taxonomy: According to ODENING (1960) the subfamily *Haematoloehinae* consists of four genera: *Haematoloechus*, *Neohaematoloechus*, *Ostolium* and *Ostioloides*. The genus *Haematoloechus* is characterized by the presence of a ventral sucker and longitudinal extracecal uterine loops. Several species of *Haematoloechus* have been described from the anuran genera *Rana*, *Bufo*, *Hyla*, *Leptodactylus*, *Bombinator* and *Hyperolius* collected from all over the world.

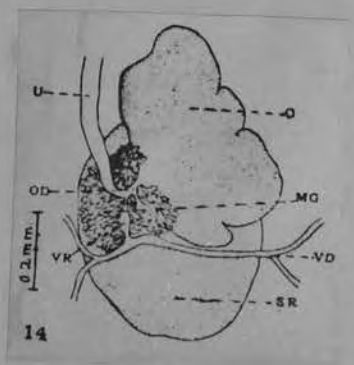
ODENING (1960) divides the genus into three subgenera: *Haematoloechus*, *Skrjabinoeces* and *Anomolecithus*. Because of the posterior limit of the grape-like vitelline follicles which does not extend behind the posterior testis, the present species definitely belongs to the subgenus *Skrjabinoeces* SUDARIKOV, 1950. The far anteriorly situated cirrus pouch and the anterior extension of the extracecal loops which are limited to the anterior margin of the posterior testis, bring the present species closer to *H.* (*S.*) *breviansa* SUDARIKOV, 1950 than to the *H. S. similis* complex. However, the presence of distinctly long and dense cuticular spines and the strongly muscular pharynx which is never smaller than the acetabulum, differentiate the new species from *H.* (*S.*) *breviansa*. The two species differ further in shape of testes and ovary. These gonads in the present species are irregular in shape and deeply lobed, while they are oval and entire in the other species. Because of these easily observed differences it is found legitimate to establish the species *H.* (*S.*) *lobogonadus*.

Specific diagnosis: With ODENING's concept of the subgenus *Skrjabinoeces*, testes and ovary deeply lobed, size of pharynx not less than that of acetabulum, with pharyngeal and esophageal glands, and with dense cuticular spines.

Plagiorchiidae

Haematoloechus longiplexus Stafford, 1902





FIGS FROM CORT (1915)

Plagiorchiidae

Haematoloechus lutzi Teixeira de Freitas and Lent, 1939

15. Haematoloechus lutzi Freitas & Lent

1939 *Haematoloechus (Haematoloechus) lutzi* Freitas & Lent, Livro de Homenagem aos Profs. A. e M. Ozorio de Almeida: 252; Tab. 4. — Terra typica: Maracay (Wirt: Anura indet.; Typus: Nr. 17.087, Col. helmintol., Inst. Oswaldo Cruz, Rio de Janeiro).

1939 *Paramonoecus tejerai* Cordero & Vogelsang, Rev. Med. vet. Paras., Caracas, 1 2/4:175; Fig. 2 (syn. fide Dobbin jr. 1957). — Terra typica: Maracay (Wirt: *Rana palmipes*; Typus: Mus. Hist. natur. Montevideo).

Diagnose (nach Freitas & Lent 1939, Cordero & Vogelsang 1939 und Caballero, Vogelsang & Zerecero 1953): Körper ziemlich gleichmäßig oblong, vorn nur wenig verjüngt, hinten abgerundet, 2,523 bis 6,50 mm lang, maximale Breite 0,747 bis 1,720 mm; Cuticula mit sehr feinen, unregelmäßig angeordneten Stacheln (nach Caballero, Vogelsang & Zerecero kräftige Stacheln nur im Bereich des Vorderkörpers; Cordero & Vogelsang geben für *H. tejerai* eine glatte Cuticula an); Größenverhältnis MSN : BSN : Pharynx ungefähr wie 2·2:1 oder wie 10:9:5; Cirrusbeutel ziemlich dick, Basis unmittelbar vor dem Vorderrand des BSN oder weiter hinter, Genitalporus auf der Höhe des Pharynx oder am Hinterr Testes unregelmäßig oval oder quer trapezförmig, glattrandig buchtet, diagonal oder fast median hintereinander gelegen; Ova mäßig oval, neben dem Receptaculum seminis hinter dem BSN li mal leicht nach hinten zu verschoben; Testes meist größer vordere Grenze der aus unregelmäßigen Follikelhaufen bestehe stöcke etwa in der Mitte zwischen den Saugnäpfen, hintere Gr Höhe des Hinterrandes des hinteren Testis oder zwischen hintere Körperhinterende; die vordere Grenze der extracaecalen Ute schwankt im Bereich des Raums hinter dem hinteren Testis bis des Hinterrandes des vorderen Testis; Eier 0,034 bis 0,038 × 0,0 mm groß (Fig. 3c).

Endwirt: Anura indet. (Maracay), *Rana palmipes* Spix (Maracay).

Geographische Verbreitung: Venezuela.

Bemerkung: Caballero, Vogelsang & Zerecero (1953) geben bei den 3 von ihnen untersuchten Exemplaren kein Receptaculum vorhanden gewesen sei.

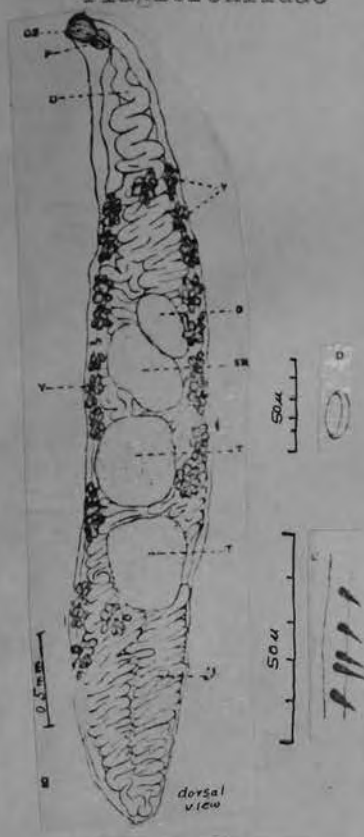
Fig. 41a Fig. 41b

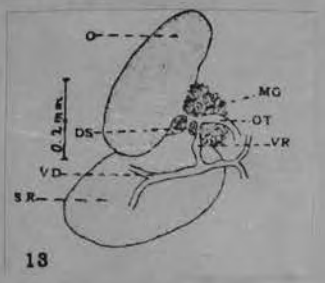
Fig. 41. *Haematoloechus lutzi*. — a) erwachsenes Exemplar, nach Freitas & Lent 1939. — b) Hypotypoid von „*H. tejerai*", nach Dobbin jr. 1957.

From Odening, 1960

Plagiorchiidae

Haematoloechus medioplexus Stafford, 1902





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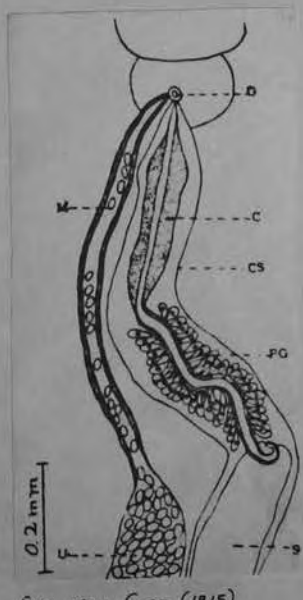
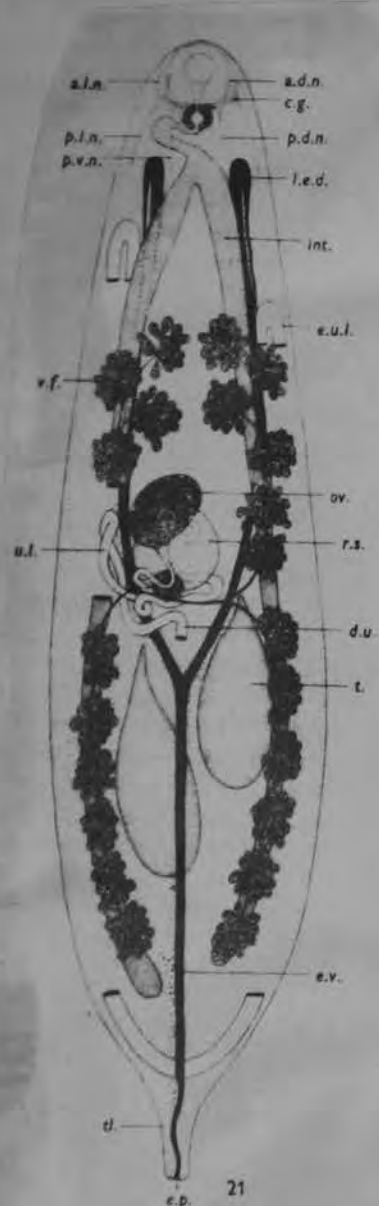
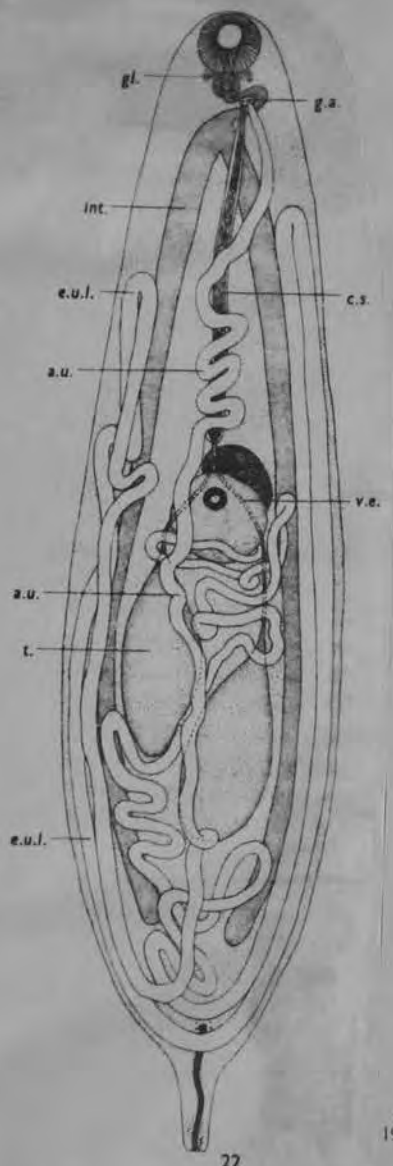


FIGS FROM CORT (1915)

Haematoloechus micrurus ~~sp.nov.~~ REES, 1964

DIAGNOSIS. Elongated, markedly flattened, tapering slightly anteriorly and with a small tail-like process posteriorly; length 8·25–13·0 mm., breadth 1·75–2·57 mm., depth 0·22–0·38 mm.; cuticle unarmed; ventral sucker 0·26 × 0·27 mm., smaller than oral sucker (0·69 × 0·55 mm.), ratio ventral sucker to oral sucker 1:2; pre-





Text-figs. 21, 22. *Haematoloechus micrurus* sp.nov.

Text-fig. 21. Dorsal view to show testes, vitellaria and excretory system. Cirrus sac and most of uterus omitted.

Text-fig. 22. Ventral view to show testes, male ducts and uterus. Vitellaria and excretory ducts omitted.

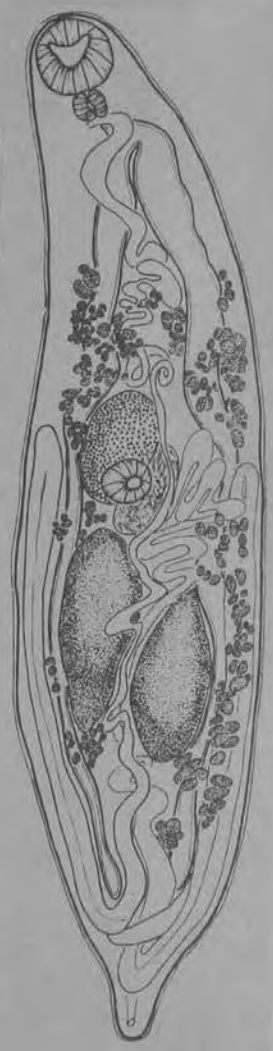


FIG 21.

Haematoloechus micrurus Rees, 1964 chez *Dicroglossus occipitalis*. Préparation totale.

FROM MAEDER, 1973

-OVER-

pharynx very short, oesophagus bifurcates some distance in front of ventral sucker, caeca long, relatively wide, extending almost to posterior extremity; excretory vesicle Y-shaped; genital atrium ventral, to left of pharynx; cirrus sac long, tubular, not quite reaching ventral sucker; testes in central region of posterior half of body, the right 1·81 × 0·67 mm., slightly in front of the left, 1·95 × 0·60 mm., oval or pear-shaped; vasa efferentia unite to form short vas deferens before entering cirrus sac; ovary oval 0·80 × 0·57 mm., obliquely placed to left of ventral sucker overlapping it slightly; vitellaria symmetrical, six to seven rosette-like groups each of twelve to eighteen follicles on each side anteriorly and posteriorly, anterior and posterior vitelline ducts paired; uterus with forward initial loop to left of ovary, descending and ascending limbs of uterus medianly placed, extra-caecal uterine loops long, extending to half way between ovary and anterior extremity; eggs dark brown 0·025–0·027 mm. × 0·016–0·020 mm.

HOST. *Rana occipitalis* (Gunther).

LOCATION. Central lumen of lung.

LOCALITY. Southern Ghana.

TYPE SPECIMENS. Deposited in British Museum (Natural History), London. Specimen no. 1963.12.9.2.

SEE REPRINT FOR MORE DETAILED DESCRIPTION.

Plagiorchidae

Haematoloechus nanchangensis Hsiung, 1934

Haematoloechus of smaller size; body elongated, more ~~rounded~~ or less club-shaped; anterior third tappering, posterior end rounded; cuticule moderately thick and in the region anterior to the ovarian zone coered with large spines, only a few scattered spines posteriorly; oral sucker subterminal, larger than acetabulum; small pharynx; moderately long esophagus; long intestinal ceca extending to posterior end of body; genital pore in midventral line in pharyngeal region; long cirrus sac with short cirrus and long seminal vesicle; testes oval to kidney-shapped, dorsal, more or less symetrically placed in the region just pre-equatorial, with their inner sides touching the seninal receptacle; ovary ellipsoid or kidney shaped, dorsal, obliquely placed, lateral to the median plane in the acetabular zone; large seminal receptacle present, medially placed; vitellaria divided into clusters of acini of large follicles arranged in two groups; uterus much coiled extending to posterior end of body, with extracecal longitudinal folds reaching anteriorly to the testicular zone; from lungs of Rana plancyi.

Locality; China

Plagiorchidae

Haematoloechus oxyorchis Ingles, 1932

Medium sized species; cuticule free from spines; ratio of the oral sucker to the acetabulum 5:4; Ovary somewhat lobed; testes unlobed and coming to acute point on anterior side; cirrus sac long extending beyond region of acetabulum; vitellaria of rather large groups acini with from 9 to 14 in a group; no folds of the uterus outside the ceca; eggs average 27 by 17 μ; from lungs of Rana aurora dratoni from Oakland California.

Most like H. complexus and H. conrugus. Differs from former in its smaller eggs and acute projection of testes. It differs from later in being spineless, in shape of testes and in larger average size. It agrees with H. complexus an tendency of ovary to be lobed, in not being spiny, in type of uterus, in shape and size, amd in its sucker ratio.

Plagiorchiidae

TEIXEIRA DE
Haematoloechus ozorioi Freitas and Lent, 1939

16. Haematoloechus ozorioi FREITAS & LENT

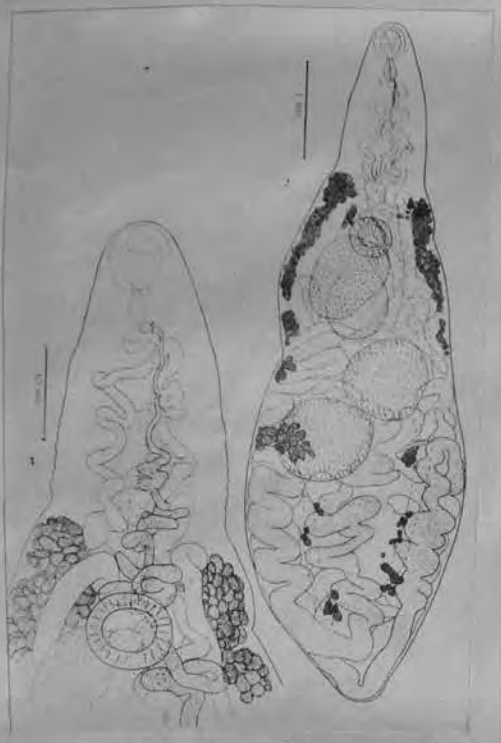
1939 *Haematoloechus (Haematoloechus) ozorioi* FREITAS & LENT, Livro de Hom Frois. A. e M. OZORIO DE ALMEIDA: 251; Tab. 3. – Terra typica: (Wirt: *Leptodactylus ocellatus*; Typus: Nr. 10562, Col. helmintol., Ins Cruz, Rio de Janeiro).

Diagnosis (nach FREITAS & LENT 1939, ergänzt nach DOBBIN Körper lanzettförmig, Vorderende deutlich verjüngt, 7,03 mm lang, breite 2,14 mm; Cuticula glatt; Größenverhältnis MSN:BSN: Pharynx-Länge) ungefähr wie 4,5:3; Cirrusbeutel-Basis dorsal vom des BSN, Genitalporus am Hinterrand des Pharynx; Testes diagonal hinander gelegen; Ovarium vor dem Receptaculum seminis, sich teilw diesem und dem BSN überschneidend; Ovarium und Testes größer al ceulum seminis; vordere Grenze der Dotterstöcke wenig vor der hintere Grenze im Bereich der blinden Enden der Darmschenkel; Grenze der geknäuelten extracaecalen Uterusschlingen im Bereich des Testis; Eier 0,021 × 0,017 mm groß (Fig. 3a).

Endwirt: *Leptodactylus ocellatus* (LINNAEUS) (Montevideo).

Geographische Verbreitung: Uruguay.

From ODENING, 1960

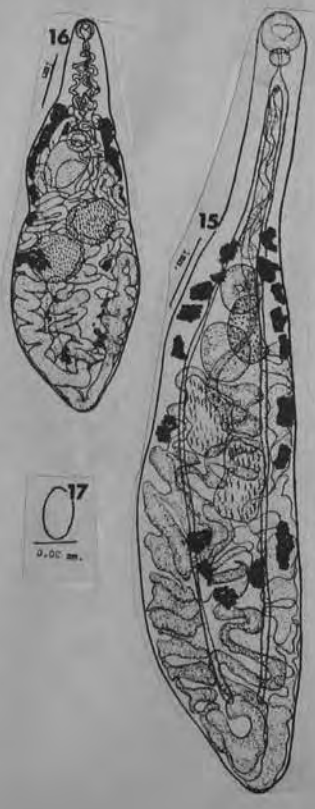


From TEIXEIRA DE FREITAS AND LENT, 1939

TABLA VI

Tabla comparativa de medidas (en milímetros) de « Pneumonoeces ozorioi » de la provincia de Buenos Aires, República Argentina y de « Pneumonoeces ozorioi » de Uruguay.

	Pneumonoeces ozorioi República Argentina	*Pneumonoeces ozorioi* Uruguay
Largo	7.10-9.43	7.03
Ancho	1.66-1.88	2.14
Ventosa oral	0.28×0.35	0.35×0.33
Acetábulo	0.36×0.52×0.41-0.54	0 41-0.46
Relación de tamaño entre la ventosa oral y el acetábulo	5: 3.5 a 5: 4	5: 4
Faringe	0.14-0.19×0.14-0.20	0.20×0.13
Testículo anterior	0.52-0.98×0.58-0.92	0.80×0.86
Testículo posterior	0.67-0.78×0.58-0.91	0.88×0.90
Ovario	0.91-0.97×0.48-0.49	0.85×0.83
Receptáculo seminal	0.78-0.84×0.78-0.84	0.66-0.71
Huevos	0.019-0.022×0.011-0.014	0.021×0.010



from Suriano, 1968

HAEMATOLOECHUS PYRENAICUS Combes, 1965

H. pyrenaicus a été décrit par nous-mêmes (1965), d'après des exemplaires recueillis chez *R. temporaria* et *B. bufo*.

Description

Les dimensions sont données d'après 45 individus mûrs montés en préparations *in toto*.

Corps (fig. 5) :

Sur le vivant, le corps est allongé, aplati dorso-ventralement, très déformable, surtout dans la région antérieure qui peut s'étirer jusqu'à devenir presque filiforme. Sur les préparations *in toto* (animaux fixés en état de légère compression), le corps présente un aspect en lancette caractéristique : les deux extrémités sont effilées régulièrement, l'extrémité postérieure étant à peine plus élargie que l'extrémité antérieure.

Les dimensions du corps sont les suivantes (longueur et largeur mesurées sur des préparations *in toto*; épaisseur sur coupes transversales et longitudinales sériées) :

— longueur : 7,60 à 13,70 mm (moyenne 10,10),
— largeur : 1,80 à 3,20 mm (moyenne 2,30),
— épaisseur : 0,50 à 0,90 mm (moyenne 0,70).

Cuticule :

Mince (4 à 5 µ), lisse; aucune spinulation n'a été constatée, ni sur le vivant, ni sur les préparations *in toto*, ni sur les coupes histologiques.

Ventouses :

Elles sont circulaires et non papilleuses.

La ventouse orale est sub-terminale; son diamètre est de 390 à 670 µ (moyenne : 480 µ).

La ventouse ventrale est située un peu en arrière du tiers antérieur du corps; son diamètre est de 260 à 430 µ (320).

La distance entre les deux ventouses varie de 2,76 à 4,98 mm (3,41). Le rapport VO/VV est égal à 1,50 en moyenne; il varie peu autour de ce chiffre; le rapport le plus bas que nous ayons observé est égal à 1,36, le plus haut à 1,72. Sur le vivant, nous avons constaté que les parasites se fixent très faiblement à la paroi pulmonaire et se laissent extraire avec la plus grande facilité.

Appareil digestif :

Il n'existe pas de prépharynx. Le pharynx a un diamètre transversal de 180 à 240 µ (220) et un diamètre antéro-postérieur de 160 à 230 µ (200). L'œsophage est court (250 µ environ), étroit (70 µ).

Les caecums s'étendent sur les côtés du corps, en suivant un tracé sinueux dû à la présence des autres organes (testicules, utérus); leur calibre est peu variable (140 à 200 µ) sauf à leur extrémité où ils se dilatent légèrement. Ils se terminent à environ 1 mm de l'extrémité postérieure du corps, mais ils ont rarement la même longueur; l'un des deux, soit le gauche, soit le droit, s'approche généralement davantage de l'extrémité du corps que son voisin. Ils sont toujours bourrés de globules sanguins en cours de digestion.

Appareil reproducteur femelle :

L'ovaire est situé juste en arrière de la ventouse ventrale, latéralement, soit dans la moitié droite, soit dans la moitié gauche du corps. Cette variation ne nous paraît obéir à aucune statistique précise; sur 45 individus nous en avons noté 26 avec l'ovaire à gauche et 19 avec l'ovaire à droite. La longueur de l'ovaire varie de 1.100 à 1.300 µ (moyenne : 1.180), sa largeur, de 570 à 650 µ (610). Il est profondément lobé sur son bord externe, presque régulier sur son bord interne; le nombre des lobes varie de 2 à 10; la profondeur des entailles dépasse la moitié de la largeur de l'organe.

L'oviducte, court et étroit, prend naissance dans la région interne de l'ovaire.

Les coupes sériées ne nous ont pas permis de mettre en évidence un canal de Laurer. Cela est en accord avec les indications données par Odening (1958) pour l'ensemble des *Haematolochidae*, mais non avec le travail de Ebrahimzadeh (1966) qui a observé un canal de Laurer de nature cuticulaire chez *Haematoloechus variegatus* Looss, 1899.

Le réceptacle séminal est très développé (jusqu'à 1.200 sur 920 µ); il est situé au même niveau que l'ovaire, dans le côté opposé du corps, mais s'avance ventralement au-dessous de lui. Sur les coupes sériées, on observe, du côté dorsal, le canal du réceptacle séminal, très court (20 µ) et étroit (3 µ).

La glande de Mehlis est bien développée; elle est située au voisinage de l'ovaire, à peu près dans le plan de symétrie du corps.

Les vitellogènes se présentent sous forme de groupes (ou rosettes) de follicules qui sont situés à droite et à gauche du corps, dorsalement, entre les limites suivantes : vers l'avant, ils s'approchent jusqu'à 1 mm environ de la ventouse buccale; vers l'arrière, ils se terminent au niveau du milieu du testicule postérieur. Ces limites peuvent être légèrement dépassées, mais il n'existe jamais de vitellogènes dans l'espace post-testiculaire.

La disposition des vitelloductes est très particulière et constante : le schéma fondamental vitelloductes longitudinaux, 2 vitelloductes transverses, 1 vitelloducte médian) est classique, mais la rtie postérieure des vitelloductes longitudinaux *ne reçoit pas le même nombre de rosettes de chaque côté :* u côté opposé à l'ovaire, il y a 3 groupes de 2 rosettes, donc 6 rosettes au total; du côté de l'ovaire, il y a ulement 3 rosettes isolées. La région antérieure de l'appareil vitellin est symétrique : 3 groupes de 2 rottes de chaque côté. Il y a donc un total de 21 rosettes de follicules. Cette disposition, qui nous avait happé en partie lors de notre description initiale, ne semble pas avoir été mentionnée chez les autres pèces du genre. Une pareille dissymétrie n'est pas sans rappeler celle que nous avons mise en évidence ez *H. cylindracea*.

L'utérus occupe un volume très important : il possède une branche escendante et une branche cendante, qui forment de très nombreuses boucles, en particulier dans la région post-testiculaire; il iste, d'une manière constante, des boucles utérines extra-caecales qui remontent depuis l'extrémité stérieure jusqu'au niveau du milieu du testicule postérieur; dans quelques cas, ces boucles extra-caeles atteignent le niveau du bord antérieur du testicule postérieur, mais elles ne le dépassent jamais vers vant. L'utérus aboutit au pore génital commun qui est ventral, médian, situé exactement au niveau du rd antérieur du pharynx.

Les œufs sont de couleur brun clair à brun foncé presque noir. La limite du clapet d'ouverture est en visible. Ils mesurent de 22 à 25 μ (23) sur 14 à 17 μ (16).

Appareil reproducteur mâle :

Les testicules sont disposés en diagonale dans la région située en arrière de la ventouse ventrale; n des testicules est toujours nettement décalé en avant par rapport à l'autre; si l'ovaire est à gauche du rps, c'est le testicule droit qui est en avant; si l'ovaire est à droite, c'est le testicule gauche.

Les deux testicules sont allongés dans le sens de l'axe de l'animal et leur longueur est toujours supéure au double de leur largeur. Le testicule postérieur est toujours le plus développé.

Testicule antérieur :

— longueur, 1.800 à 4.170 μ (2.220);
— largeur, 610 à 1.570 μ (930).

Testicule postérieur :

— longueur, 1.900 à 4.670 μ (2.680);
— largeur, 570 à 1.300 μ (840).

Les testicules sont lobés, principalement sur leur bord externe (le bord interne est soit lisse, soit blement lobé). Le nombre des lobes varie de 3-4 à plus de 15; il dépasse 10 assez souvent. La profondeur s sinuosités peut atteindre la moitié de la largeur du testicule; plus généralement, elle est égale au tiers de ur largeur.

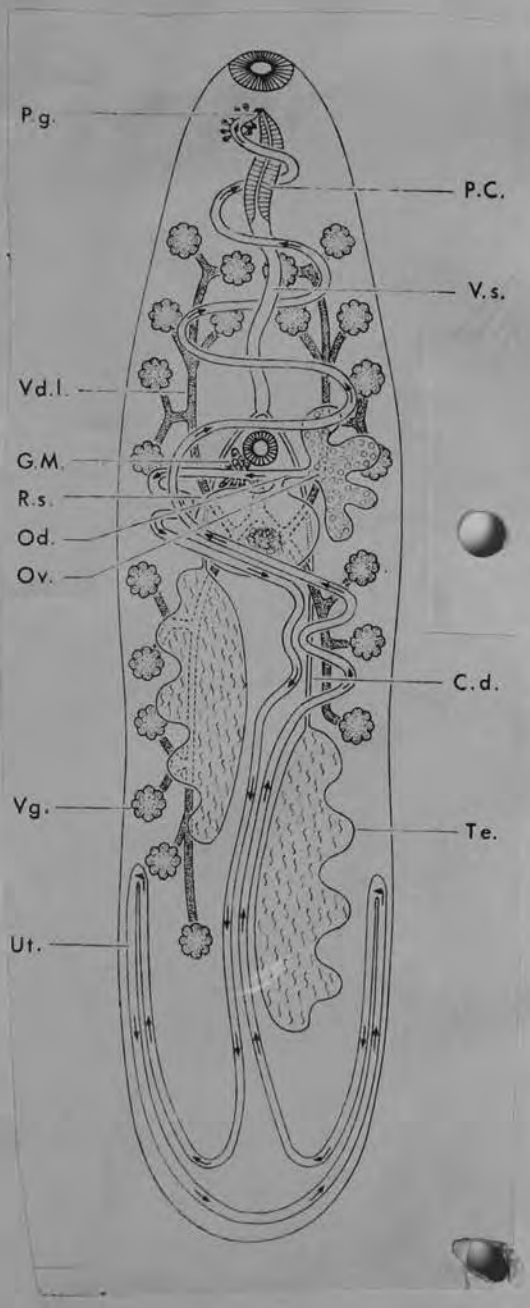
Les canaux déférents prennent naissance à l'extrémité antérieure des testicules, se dirigent vers vant et se jettent au même point, à l'extrémité postérieure de la vésicule séminale.

La vésicule séminale, très longue, flexueuse, s'étend depuis le niveau de l'ovaire jusqu'au niveau pharynx, où elle rejoint la partie postérieure de la poche du cirre; son diamètre est régulier (105 μ après les coupes sériées).

La poche du cirre, ventrale, mesure 440 μ de longueur sur 75 μ de diamètre; elle débouche au pore nital.

Appareil excréteur :

La vessie n'est pas visible sur les individus montés *in toto*. Par contre, on l'observe très bien sur coupes sériées. Elle forme un Y dont la branche médiane est beaucoup plus longue que les branches ales, la bifurcation se faisant au niveau du bord postérieur du réceptacle séminal. Par rapport à ce der-r, les branches paires sont en position latéro-ventrale; vers l'avant, elles se terminent à 1 mm environ pharynx.



COMBES, 1965

HAEMATOLOECHUS PYRENAICUS n. sp.

Plagiorchiidae

Hôtes : *Rana temporaria temporaria* L., *Bufo bufo bufo* L.
Habitat : poumons.
Localités : Riemford, Puyvalador (canton de Mont-Louis, Pyrénées-Orientales).

Corps :

Sur le vivant, le corps est allongé, aplati dorso-ventralement, très déformable, surtout dans la région antérieure qui peut s'étirer jusqu'à devenir presque filiforme. Sur les préparations *in toto* (animaux fixés en état de légère compression), le corps présente un aspect en lancette caractéristique : les deux extrémités sont effilées régulièrement, l'extrémité postérieure étant à peine plus élargie que l'extrémité antérieure (fig. 1 *a*).

Les dimensions du corps sont les suivantes (longueur et largeur mesurées sur des préparations *in toto* ; épaisseur sur coupes transversales et longitudinales sériées) :

Longueur : 7,6 à 13,7 mm (moyenne 10,1).
Largeur : 1,8 à 3,2 mm (moyenne 2,3 mm).
Epaisseur : 0,5 à 0,9 mm (moyenne 0,7 mm).

Cuticule :

Mince (0,004 à 0,005 mm), lisse ; aucune spinulation n'a été constatée, ni sur le vivant, ni sur les préparations *in toto*, ni sur les coupes histologiques.

Ventouses :

Circulaires, non papilleuses.

Ventouse orale : sub-terminale ; diamètre : 0,39 à 0,67 mm (moyenne : 0,48 mm).

Ventouse ventrale : un peu en arrière du tiers antérieur du corps ; diamètre : 0,26 à 0,43 mm (0,32).

La distance entre les deux ventouses varie de 2,76 à 4,98 mm (3,41). Le rapport ventouse orale sur ventouse ventrale est égal à 1,50 en moyenne ; il varie peu autour de ce chiffre : le rapport le plus bas que nous ayons observé est égal à 1,36, le plus haut à 1,72. Sur le vivant, nous avons constaté que les parasites se fixent très faiblement à la paroi pulmonaire et se laissent extraire avec la plus grande facilité.

Tube digestif :

Bouche : au centre de la ventouse antérieure. Prépharynx : absent. Pharynx : diamètre transversal : 0,18 à 0,24 mm (0,22) ; diamètre antéro-postérieur : 0,16 à 0,23 mm (0,20 mm). Œsophage : court (0,25 mm environ), étroit (0,07 mm).

Caecums : s'étendent sur les côtés du corps, en suivant un tracé sinueux dû à la présence des autres organes (testicules, utérus) ; leur calibre est peu variable (0,14 à 0,20 mm), sauf à leur extrémité où ils se dilatent légèrement. Ils se terminent à environ 1 mm de l'extrémité postérieure du corps, mais ils ont rarement la même longueur ; l'un des deux, soit le gauche, soit le droit, s'approche généralement davantage de l'extrémité du corps que son voisin. Ils sont toujours bourrés de globules sanguins en cours de digestion.

Appareil reproducteur mâle :

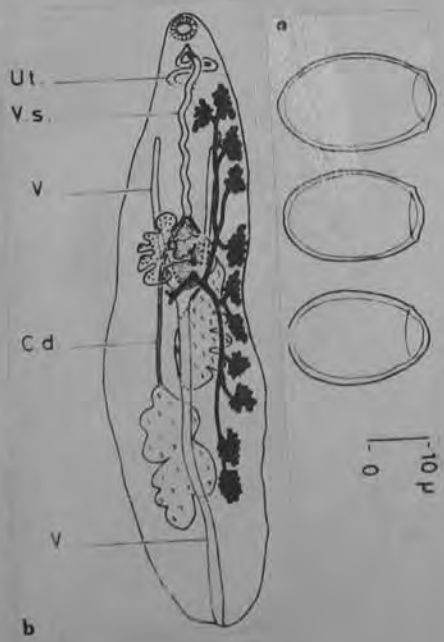
Testicules : disposés en diagonale dans la région située en arrière de la ventouse ventrale ; l'un des testicules est toujours nettement décalé en avant par rapport à l'autre ; c'est tantôt le gauche, tantôt le droit ; si l'ovaire est à gauche du corps, c'est le testicule droit qui est en avant ; si l'ovaire est à droite, c'est le testicule gauche. Cette variation ne nous paraît obéir à aucune statistique précise ; sur les 45 individus, nous en avons noté 26 avec le testicule droit en avant, les 19 autres montrant la position inverse.

Les deux testicules sont allongés dans le sens de l'axe de l'animal et leur longueur est toujours supérieure au double de leur largeur. Le testicule postérieur est toujours le plus développé.

Testicule antérieur : longueur : 1,80 à 4,17 mm (moyenne : 2,22 mm) ; largeur : 0,61 à 1,57 mm (0,93).

Testicule postérieur : longueur : 1,99 à 4,67 mm (2,68) ; largeur : 0,57 à 1,30 mm (0,84).

a



b

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Les testicules sont lobés, principalement sur leur bord externe (le bord interne est soit lisse, soit faiblement lobé). Le nombre des lobes varie de 5-6 à plus de 15 ; il dépasse 10 le plus souvent. La profondeur des entailles peut atteindre la moitié de la largeur du testicule ; plus généralement, elle est égale au tiers de cette largeur.

Canaux déférents : prennent naissance à l'extrémité antérieure des testicules, se dirigent vers l'avant et se jettent au même point, à l'extrémité postérieure de la vésicule séminale (fig. 1 *b*).

Vésicule séminale : très longue, flexueuse, s'étend depuis le niveau de l'ovaire jusqu'au niveau du pharynx, où elle rejoint la partie postérieure de la poche du cirre ; son diamètre est régulier (0,105 mm d'après les coupes sériées).

Poche du cirre : ventrale, mesure 0,440 mm de longueur sur 0,075 mm de diamètre ; elle débouche au pore génital commun qui est ventral, médian, situé exactement au niveau du bord antérieur du pharynx.

APPAREIL REPRODUCTEUR FEMELLE :

Ovaire : situé juste en arrière de la ventouse ventrale, latéralement, soit dans la moitié droite, soit dans la moitié gauche du corps, ainsi qu'il a été dit plus haut. Sa longueur varie de 1,11 à 1,30 mm (moyenne : 1,18), sa largeur de 0,57 à 0,65 mm (0,61). Il est profondément lobé sur son bord externe, presque régulier sur son bord interne ; le nombre des lobes varie de deux à dix ; la profondeur des entailles dépasse la moitié de la largeur de l'organe.

Oviducte : court et étroit ; il prend naissance dans la région interne de l'ovaire.

Canal de Laurer : absent.

Réceptacle séminal : très développé (jusqu'à 1,20 mm sur 0,92 mm) ; il est au même niveau que l'ovaire, dans le côté opposé du corps, mais s'avance ventralement au-dessous de lui. Sur les coupes sériées, on observe, du côté dorsal, le canal du réceptacle séminal, très court (0,020 mm) et étroit (0,003 mm).

Glande de Mehlis : bien développée, elle est située au voisinage de l'ovaire, à peu près dans le plan de symétrie du corps.

Glandes vitellogènes : se présentent sous forme de groupes (ou rosettes) de follicules qui sont situés à droite et à gauche du corps, dorsalement, entre les limites suivantes : vers l'avant, ils s'approchent jusqu'à 1 mm environ de la ventouse buccale ; vers l'arrière, ils se terminent au niveau du milieu du testicule postérieur dans le côté du corps opposé à l'ovaire. Ces limites peuvent être légèrement dépassées, mais il n'existe jamais de vitellogènes dans l'espace post-testiculaire.

Le nombre de rosettes est typiquement de 20-22, le nombre de follicules par rosettes s'écarte peu de la douzaine.

Chaque rosette possède un canal vitellin : les canaux d'un même côté du corps se réunissent pour former un vitelloducte latéral ; il existe deux vitelloductes transverses qui se jettent dans un vitelloducte impair, lequel débouche dans l'oviducte (fig. 1 *b*).

Utérus : il occupe un volume très important : il possède une branche descendante et une branche ascendante qui forment de très nombreuses boucles, en particulier dans la région post-testiculaire ; il existe, d'une manière constante, des boucles utérines extra-caecales qui remontent depuis l'extrémité postérieure jusqu'au niveau du milieu du testicule postérieur ; dans quelques cas, ces boucles extra-caecales atteignent le niveau du bord antérieur du testicule postérieur, mais elles ne le dépassent jamais vers l'avant.

Œufs : couleur brun clair à brun foncé. Forme régulière, moyennement allongée ; limite du clapet d'ouverture bien visible (fig. 1 *c*). Dimensions : 0,022 à 0,025 mm (moyenne : 0,023) sur 0,014 à 0,017 mm (0,016).

APPAREIL EXCRÉTEUR :

La vessie n'est pas visible sur les individus montés *in toto*. Par contre, on l'observe très bien sur les coupes sériées. Elle forme un Y dont la branche médiane est beaucoup plus longue que les branches paires, la bifurcation se faisant au niveau du bord postérieur du réceptacle séminal. Par rapport à ce dernier, les branches paires sont en position latéro-ventrale ; vers l'avant, elles se terminent à 1 mm environ du pharynx.

Discussion

Les individus que nous décrivons font partie de la famille des *Haematoloechidae* Odening 1964 et appartiennent au genre *Haematoloechus* Looss 1899. Certains de leurs caractères les rapprochent des espèces européennes *H. variegatus* (Rudolphi 1819) Looss 1899 et *H. schulzei* (Wundsch 1911), de l'espèce nord-américaine *H. breviplexus* Stafford 1905, de l'espèce africaine *H. exoterorchis* Rees 1964.

En effet, *H. variegatus* possède des testicules relativement allongés et parfois à bords irréguliers, et des œufs de dimensions comparables à celles de nos individus. Mais la présence de vitellogènes dans l'espace post-testiculaire, le caractère très limité et inconstant des entailles testiculaires, l'absence d'entailles ovariennes nettes chez *H. variegatus* sont en contradiction formelle avec notre description.

H. schulzei, malgré sa grande taille et les dimensions de ses œufs, s'éloigne de nos exemplaires par sa cuticule spinulée, ses testicules peu irréguliers, son ovaire ovoïde.

Quant à *H. breviplexus*, il possède, d'après Stafford (1905) et Cort (1915), des testicules fortement allongés et lobés, tantôt sur leur bord externe, tantôt sur leur bord interne, ainsi qu'un ovaire largement découpé. Mais, chez cette espèce, le rapport ventouse orale sur ventouse ventrale est égal à deux, les vitellogènes s'étendent en arrière du testicule postérieur et les lacets extra-caecaux de l'utérus remontent presque jusqu'au niveau de l'ovaire (la cuticule est spinulée d'après Stafford, lisse d'après Cort, de sorte que ce caractère ne peut être pris en considération).

Enfin, *H. exoterorchis* se rapproche de notre espèce par ses testicules lobés et les dimensions des œufs, mais s'en différencie principalement par l'ovaire piriforme et l'extension post-testiculaire des vitellogènes.

Plagiorchiidae

Haematoloechus sibiricus (Issaitschikoff, 1927) Ingles, 1932

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FAMILY PLAGIORCHIIDAE

Haematoloechus sibiricus (Issaitschikoff, 1927) Ingles, 1932

SYNONYM: *Pneumonoeces sibiricus* Issaitschikoff, 1927.

HOST: *Oocidozyga laevis laevis* (Ranidae).

HABITAT: Small intestine (probably should be lungs).

LOCALITY: Tarabanan Concepción, Palawan Island, Philippines.

DATE: 12 May 1962.

SPECIMEN: USNM Helm. Coll. No. 60194.

MEASUREMENTS (1 specimen): Body 3.819 by 287 at anterior margin of vitellaria and 636 at seminal receptacle; forebody 1,395, hindbody 2,262, posttesticular space 944, postvitellarian space 491; oral sucker 139 in diameter, acetabulum 162 by 126, sucker length ratio 1:1.16; prepharynx 34 long; pharynx 81 by 86; anterior testis 429 by 221, posterior testis 394 by 243; acetabulum to anterior testis 493, to posterior testis 876; ovary 228 by 245, overlapping acetabulum; seminal receptacle 291 by 239, 184 postacetabular; vitellaria extending 865 preacetabular and 1,771 postacetabular; right uterine fold extending 383 and left 356 preacetabular; 10 eggs measuring 19 to 21 by 12 to 15.

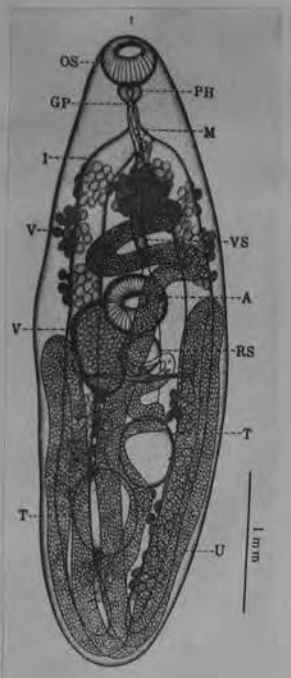
DISCUSSION: Odening (1958) reviewed the subfamily Haematoloechinae Freitas and Lent, 1939 (syn. Pneumonoecinae Mehra, 1937), listing 4 subspecies of *H. sibiricus* from Siberia, China, Korea, and Japan. Skrjabin and Antipin (1962) also reviewed the subfamily, accepting these subspecies.

FROM FISCHTHAL AND KUNTZ (1964)

Plagiorchiidae

Haematoloechus sibiricus jeholensis (Fukui & Ogata) Odening, 1958
syn. Pneumonoeces jeholensis Fukui & Ogata, 1938

1. ***Pneumonoeces jeholensis*** ~~n. sp.~~ (PL. I, Fig. 1) FUKUI AND OGATA, 1938



A single specimen of the present species was obtained from the lung of *Rana nigromaculata nigromaculata* from Ling-Yuang. The host with the parasite in its lung was preserved in formalin and thus the parasite was left to be fixed as the formalin was soaked into the lung of the host. It is, however, of much regret that we have only one single specimen, and that it is so much contracted and arched that the detailed study of it is almost impossible. But fortunately, as we could obtain materials from Korea and Manchoukuo afterward, we were able to make a thorough study of them through a comparative study.

Description: The body of the parasite, in total preparation, is long oval in shape the anterior half of the body being gradually narrowed; anterior extremity is obtusely pointed, with the greatest breadth almost in the middle or slightly behind of the body, tapering somewhat toward the posterior portion of the body. It is bluntly rounded at the posterior extremity, as shown in the figure. Body length is 5 mm. and the greatest breadth 1.4 mm.

Body is covered with fine spines which can be detected by observing the fixed specimen.

The oral sucker is situated at the anterior extremity of the body, opening on the ventral surface. It is nearly spherical in shape, being more or less crosswise and measures 0.38 mm. × 0.44 mm. The pharynx follows closely behind the oral sucker, spherical, measuring 0.16 mm. in diameter, and connects by a short oesophagus measuring 0.28 mm. in length. Oesophagus is somewhat narrow, divided into two intestinal caeca. Intestinal caeca are somewhat thick, and after running either side of the body terminate blind, reaching nearly to the posterior end of the body. Ventral sucker is situated somewhat anterior to the middle of the body, almost spherical in outline, but somewhat lengthened crosswise, and is oval, having a transverse diameter of 0.51 mm. and the longitudinal 0.46 mm. It is apparently larger than the oral sucker, the ratio between this and the oral sucker being 1.2:1.

The testes are situated in the anterior part of the posterior one third of the body, almost in the intracaecal area, one arranged obliquely behind the other. Anterior testis is situated at the anterior part of the last third of the body, inclined somewhat towards the left side of the median line, oval with the surface entire, the major axis of 0.64 mm. while the minor of 0.51 mm.; and the former nearly parallel to the body axis and situated in the midway between the latter and the left intestinal caecum. Posterior testis is obliquely behind the anterior one, apparently larger than the latter, oval with the surface entire, longitudinal axis being 0.73 mm. and the transverse 0.57 mm. The longitudinal axis is slightly inclined to the left side and lies close to the right of the median line. Cirrus pouch arises from somewhat anterior to the ventral sucker, and passes the ventral side of oesophagus, nearly along the body axis opening at the posterior margin of pharynx close to the female genital aperture on the ventral side. It is 1.35 mm. long and 1.0 mm. wide. It has a long and narrow seminal vesicle beside a cirrus protrusible in nature.

The ovary is situated in the right side of the ventral sucker, relatively large; its anterior portion is dilated and the posterior half looks as though the inner side were cut off, so that the whole shape presents nearly reniform. Ovary is elongated longitudinally and measures 0.75 mm., transverse diameter of the anterior half being 0.52 mm. and that of the posterior 0.41 mm. Oviduct arises from the middle part on the inner side of ovary, runs slightly intero-posteriorly, and after uniting with vitelline duct

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on the median line of the body, becomes the uterus. The uterus runs posteriorly with slight convolutions through the intracecal region, passes between the testes and when it reaches the posterior border of the body, turns to the left, running towards the front as it winds around the extremity of the left intestinal caecum, running up the extracecal area; after reaching nearly the same height as the middle of the ventral sucker, it turns back posteriorly along the ventral side of the left caecum, and after it has proceeded along the posterior extremity of the body, it again turns to the right; it then courses on the right side of the body up to the height of the posterior border of the ventral sucker, then takes backward course along the side of the body, and after reaching the posterior extremity of the body, it again courses along the middle axis of the body up to the equatorial region. Then it takes forward its course as it slowly winds the median axis, when it turns to the left of the anterior margin of the ventral sucker until it reaches the left caecum area then it takes its transverse courses back toward the right side till it reaches the right intestinal area. There it takes another turning toward up to the left side, and after winding a few times in the intra-cecal area, it runs subobliquely the intestinal bifurcation, and after that it opens soon on the ventral surface of the posterior margin of the pharynx close to the female genital aperture.

Vitellaria are scattered on both sides of the body from the level of the intestinal bifurcation to the region just a little in front of the posterior extremity of the body, forming a mass of a dozen or more than twenty small follicles. Such masses number 15–17. The follicles are small, spherical or ovoid in shape, measuring 94–122μ in the longest diameter, and the vitelline mass 0.28–0.45 mm. In the specimen figured, there are about 7 masses on the right side and 8 on the left. The masses from either side meet at a place immediately behind the intestinal bifurcation.

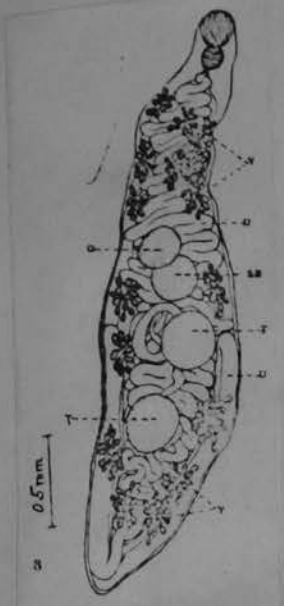
The eggs in the uterus are short oval, nearly spherical and are comparatively small, measuring 25×15μ, 26×17μ, 27×17μ, 25×18μ, 25×17μ and 26×14μ. The egg-shells are well-developed; mature eggs are dark yellowish brown in colour but immature ones are pale yellowish, changing gradually into dark yellowish brown as it matures. The uterus is filled with so numerous eggs that the posterior half of the body looks yellowish brown with the extremity of it nearly black.

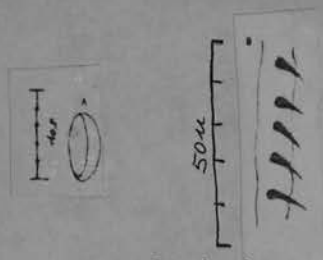
It is very evident from the organization that the present species should belong to the genus *Pneumonoeces*. Judging from this respect, the most closely allied species is *P. sibiricus* ISSAITSCHIKOW, 1927. But the latter differs distinctly from the present species in the following respects. In the present species, the fold of the uterus on either side of the body reaches about the middle of the body, viz. hardly reaches the ventral sucker, while in *P. sibiricus* the fold is apparently extending beyond the ventral sucker. In this species, the testis is obtusely elliptical, nearly spherical in shape, noticeably long oval as against in the case of the species from Siberia. Again, a remarkable point of difference between the two is the size of the eggs. In this species the eggs measure 25–27×15–17μ, but those of *P. sibiricus* are 34×19μ. Even in the subspecies, *P. sibiricus japonicus* recently recorded by Satyû YAMAGUTI, the eggs are as large as 26–33×15–21μ, and so it is clearly distinguishable that the present species differs from either of the forms mentioned.

Further, in the one reported as *P. variegatus* by Hidemi SENO in 1909 the ventral sucker apparently seems to be larger than the oral sucker in the figure given in his report. As it has been pointed out by YAMAGUTI, it is not *P. variegatus*, but it rather resembles to the present species. We cannot, however, draw our final conclusion on the subject, as the detailed descriptions of the former are lacking.

Plagiorchiidae

Haematoloechus similiplexus Stafford, 1902





FIGS FROM CORT (1918)

Haematoloechus singaporensis sp. n.
(plate II)

Diagnosis (based on over 30 specimens from lungs of *Rana cancricora*, measurements from six gravid worms): Body elongate, anterior half narrower, posterior end broadly rounded; body length 5.0 to 8.5; maximum width 1.23 to 2.27, at testicular level. Cuticle with spines decreasing in number posteriorly. Oral sucker subterminal, 0.23 to 0.38 long, 0.32 to 0.43 wide. Prepharynx and esophagus absent, pharynx subspherical, 0.14 to 0.20 long, 0.13 to 0.18 wide; ceca wide, sinuous, thin-walled, usually filled with blood, terminating 0.37 to 0.57 from posterior end of body. Acetabulum somewhat anterior to midlevel of body, 0.19 to 0.27 in diameter. Sucker ratio 3:2.

Testes oval to elliptical or slightly irregular in outline, diagonal, with left testis anterior to right, situated about midway between acetabulum and posterior end of body, 0.57 to 1.10 long, 0.34 to 0.57 wide. Genital pore median, ventral to pharynx. Cirrus pouch tubular, extending posteriorly slightly to right of mid-line, about halfway from pharynx to acetabulum; cirrus short, pars prostatica poorly defined, seminal vesicle sinuous, tubular.

Ovary 0.40 to 0.81 long, 0.29 to 0.42 wide, on right, near acetabulum; its anterior portion sometimes overlapping that sucker; ovary indented laterally to form four unequal lobes in large worms, fewer in young specimens; median surface smooth, slightly concave. Seminal receptacle spherical to oval, 0.32 to 0.91 long, 0.22 to 0.57 wide, median to posterior half of ovary; Mehlis' gland just anterior to receptacle. Vitelline follicles in distinct clusters, four lateral to each cecum and three median intercecal clusters in posterior two-thirds of forebody; hindbody with ten clusters lateral and posterior to testes; intercecal clusters often obscured by uterine coils distended with eggs. Uterus extends from Mehlis' gland posteriorly almost to end of body, forming characteristic extracecal loop almost reaching midlevel on each side, and then extending anteriorly to open at genital pore, filling intercecal region of forebody with transverse loops that overlap and occasionally overreach the ceca, their number and extent depending on maturity of specimen. Eggs operculate, oval, 0.033 to 0.037 by 0.017 to 0.020.

Excretory vesicle narrow, Y-shaped, reaching level of seminal receptacle. Excretory pore subterminal.

Host: *Rana cancrivora* Gravenhorst.

Site: Lungs.

Locality: Singapore.

Type specimens: Paratypes Helminthological Collection, Dept. of Zoology, University of Singapore; holotype and paratypes USNM Helm. Collection No. 59687.

Discussion: The genus *Haematoloechus* Looss was revised by Travassos and Darriba (1930) and by Caballero and Sokoloff (1934). Yamaguti (1958) listed 45 species. *Haematoloechus singaporensis* resembles most closely *H. almorai* (Pande, 1937), but is distinguished from that species by the sucker ratio, presence of cuticular spines, absence of an esophagus, position of the genital pore, and the much smaller eggs.

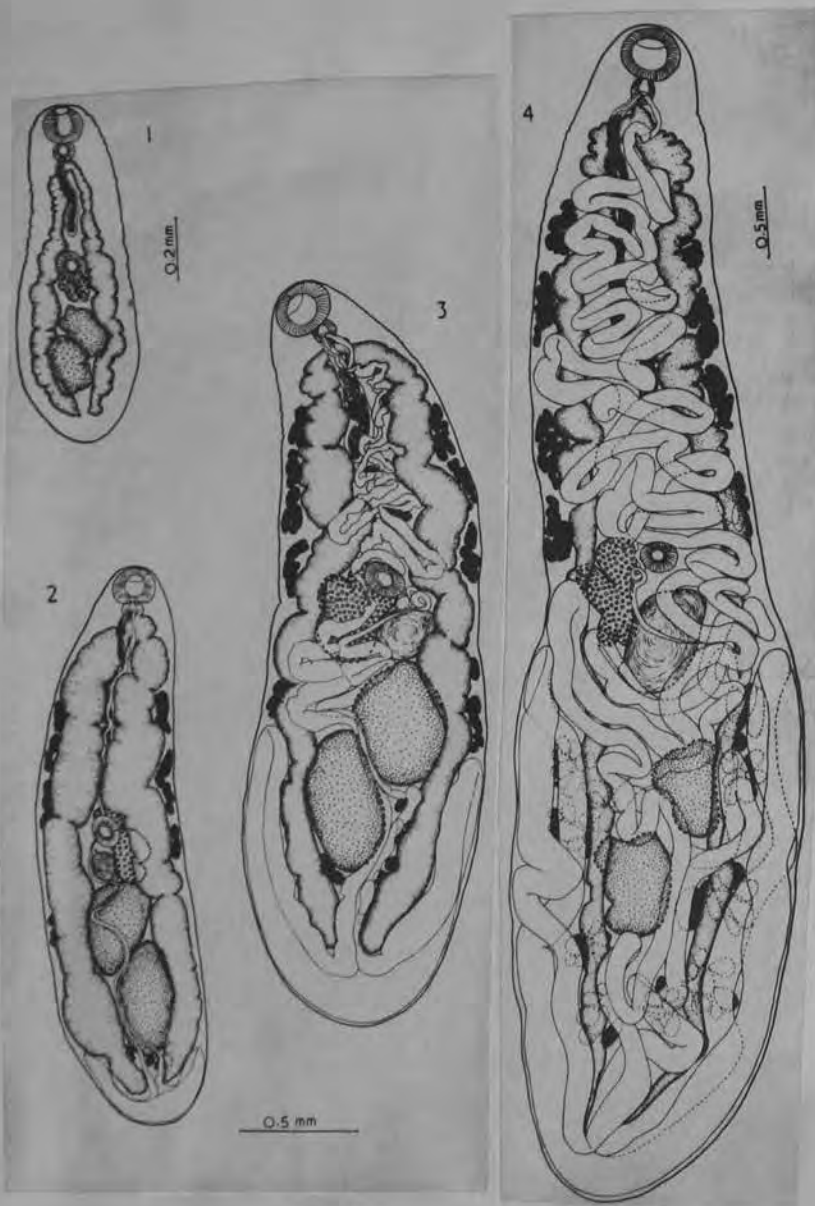


PLATE II. *Haematoloechus singaporensis* sp. n.

FIGURES 1–3. Specimens of increasing size, showing development of reproductive systems (all in ventral view). FIGURE 4. Large, mature specimen in ventral view.

2. *PNEUMONOECES TEJERAE* n. sp. Cordero and Vogelsang, 1939

(Figura 2)

Medidas, en milímetros:	L	l
Longitud total	6,50	
Ancho		1,50
Ventosa anterior	0'50	× 0,42
Faringe	0,21	× 0,27
Ancho de los ciegos intestinales		0,06
Ventosa ventral	0,45	× 0,36
Testículo anterior	0,81	× 0,60
" posterior	1,11	× 0,54
Bolsa del cirro	0,60	× 0,15
Ovario	0,42	× 0,18
Vesícula seminal	0,50	× 0,24
Huevos maduros en el útero	0,036	× 0,020

Cuerpo alargado, de tamaño mediano, con el extremo anterior ligeramente truncado y el posterior redondeado.

La cutícula es lisa y sin espinas.

La ventosa anterior es relativamente grande y subterminal. La longitud de la faringe es igual a dos quintos de la de aquella. El esófago es muy breve y los ciegos intestinales, de escaso espesor, no alcanzan hasta el extremo distal del cuerpo.

La ventosa ventral es algo menor que la anterior, pues su longitud representa los nueve décimos de ésta.

Los testículos son irregularmente elípticos—en el ejemplar que sirvió para dibujar la figura 2, montado en bálsamo, aparecen ambos con sus bordes redondeados, pero otrso especimenes ofrecen contorno poligonal—lisos y enteros, pues no presentan lóbulos. Son desiguales en tamaño, valiendo el anterior en longitud sólo las tres cuartas partes del posterior. Están colocados, con escasa separación entre ambos, oblicuamente uno detrás del otro. En la faz dorsal se perciben bien los conductos eferentes así como el canal deferente, en tanto que en la ventral a mitad de distancia entre las ventosas se advierte su término en el cirro, así como el codo que forma aquél con la bolsa de éste.

El ovario, elíptico y alargado, es menor que el testículo anterior—sólo mide la mitad de la longitud de él—en su borde derecho está la vesícula seminal, que es mayor que el mismo, hallándose ambos a la misma distancia del testículo anterior, como éste lo está del posterior.

Los vitelógenos se observan bien en la faz dorsal, distribuidos formando cuatro grupos principales, uno anterior, situado por delante del acetábulo y constituido por cuatro o cinco acumulaciones de folículos, otro posterior, detrás del segundo testículo, por cinco, y dos grupos laterales y extracecales representado por cuatro cada uno. Se advierte muy bien en el dorso los viteloductos y su terminación junto a la vesícula seminal.

Las primeras ansas uterinas se dirigen hacia adelante, disponiéndose alrededor de la ventosa ventral, luego se vuelven hacia atrás formando bucles longitudinales generalmente, disponiéndose en la porción posterior en ansas cuya amplitud

(over)

alcanza el polo anterior del segundo testículo, para luego dirijirse hacia adelante contorneando ambos órganos masculinos, así como los femeninos, para luego formar un ovillo del lado derecho del acetábulo hasta llegar al metrotérmino o poro femenino, situado como habitualmente, frente al comienzo del esófago, donde también aboca el poro masculino.

Pneumonoeces tejerae n. sp. se asemeja mucho a *Pn. elongatus* Caballero & Sokoloff, 1933, y por lo tanto, a *Pn. complexus* Seeley, 1906, pero difiere de ellos por la presencia de pliegues extracecales en las ansas uterinas, que son muy breves en el primero y llegan a faltar en el segundo, aparte de otras diferencias, como la relación entre las ventosas, que es 10:5 en *Pn. elongatus*, pero sólo 10:9 en *Pn. tejerae*.

Hemos dispuesto para erigir esta especie hasta de una docena de ejemplares recogidos, como la anterior, en el pulmón de *Rana palmipes* Spix procedente de Maracay, Estado de Aragua, en enero de 1939.

Las cuatro especies del género *Pneumonoeces*—que habita exclusivamente en el pulmón de los batracios anuros—hasta ahora conocidas de la América meridional, *Pn. Fuellebornii* Travassos & Artigas, 1920 y *Pn. neivae* Travassos & Darriba, 1930, y las dos que acabamos de describir, pertenecen a las formas que carecen de espinas en la cutítula, pero entre ellas no existe verosimilmente ninguna rleación filogenética, pues estas especies tienen cada una por su parte su ascendencia en las correspondientes de la América del norte. Así, por ejemplo, *Pn. iturbei* tiene relación con *Pn. parviplexus* Irwin, aunque el primero carece de acetábulo, que lo ha perdido en el curso de su evolución filogénica, tal como le ha ocurrido a *Pn. neivae*, que se relaciona con *Pn. varioplexus* Stafford, 1902, también de la América del norte. *Pn. tejerae* es pariente de *Pn. elongatus* y de *Pn. complexus*, ambos de la misma procedencia. (1)

(1) *Rana palmipes* Spix, el huésped de ambas nuevas formas, es un extraño habitante de Sud América, donde por sí solo representa este género tan extendido en Palaeogea. Es probable que el mejor conocimiento de los parásitos de esa especie suministre datos preciosos en la historia de los mismos.

Dedicamos las dos nuevas especies en homenaje a los investigadores de la parasitología venezolana doctores Juan Iturbe y Enrique Tejera, de Caracas.

From Cordero and Vogelsang, 1939

Haematoloechus tientsinensis Hsiung, 1934

Diagnosis: Haematolechus of medium size; body elongated, tapering anteriorly, posteriorly more or less bluntly rounded; Cuticule thin and entirely covered with small apines; oral sucker subterminal, smaller than acetabulum; medium sized pharynx; short esophagus; long intestinal ceca extending to posterior end of body; genital pore in mid-ventral line in the pharyngeal region; long cirrus sac withshort cirrus and long seminal vesicle; testes elongate, without lobes, on opposite sides of the body, behind the ovary, one usually in front of the other; ovary oval or kidney-shaped, dorsal and median in the acetabular zone; large seminal receptacle present; vitellaria divided into clusters of small acini arranged into three groups; uterus much coiled extending to the posterior end of the body, with extracecal longitudinal folds reaching anteriorly to the acetabular zone; eggs average 28 by 18 µ, operculated; from lungs of Rana nigromaculata.

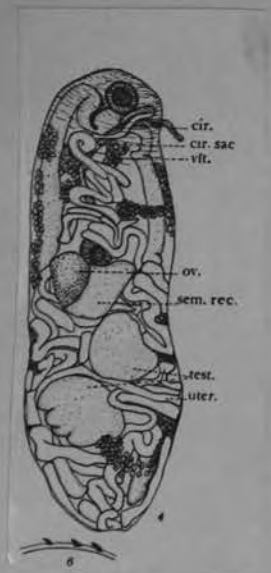
Locality: China

This species seems to be a synonym of Haematoloechus sibiricus (Issaitschikow, 1927) n.comb. H.W.M.

Haematoloechus tumidus Ingles,1932

Has usual charachers of the genus except the acetabulum is larger than the oral sucker; large thick spines and only on the anterior end; testes oval or lobed; vitellaria of variable sized acini with 6 to 31 in a group; longitudinal folds of the uterus extending outside the ceca up to the posterior limit of posterior testis; eggs average 32 by 17 u; from lungs of Rana aurora draytonii from Bakersfield,Califorina.

It differs from all other species in being larger and in that the acetabulum is larger than oral sucker.



HAEMATOLOECHUS UNIPLEXUS, new species Harwood, 1932

PLATE 2, FIGURE 1

Specific diagnosis.—Haematoloechus: The body is an elongated oval, slightly pointed at the anterior end. It measures 4.25 by 0.7 mm. The cuticula is smooth and without spines. The oral sucker is 0.22 mm in diameter. Its ratio to the pharynx is as 2:3, and its ratio to the acetabulum is close to as ~~1:3.~~ 3:4. The pharynx is 0.14 mm in diameter, and the acetabulum is 0.08 mm in diameter. The length of the esophagus is equal to about two-thirds the diameter of the pharynx. From it the intestinal ceca extend to the posterior end of the body. The ovary lies beside the acetabulum. It is an elongate, irregularly lobed structure with its long axis parallel to the long axis of the body. The uterus, after a few folds just anterior to the ovary, turns toward the posterior end. It follows the usual course with the usual confusion of loops and windings to the posterior end of the body. The longitudinal folds outside of the intestinal ceca are very poorly developed. There is a short loop on the left side of the body extending only to the caudal margin of the posterior testis. There is no loop of the uterus on the right side of the body. From the posterior end of the body, the uterus follows the usual course forward to the genital pore, which lies in the pharyngeal region. The vitellarian follicles are so closely grouped that it is very difficult to form an accurate opinion of the number of follicles to the group. There seem to be 9 or 10 follicles to the group and about 21 groups. On the left side of the body the follicles cease at the level of the cephalic margin of the caudal testis. On the right side there are three groups of follicles, below this point. The eggs vary from 21μ by 17μ to 17μ by 13μ. The testes are elongate bodies, with entire margins that overlap slightly. The anterior testis measures 0.5 by 0.16 mm and the posterior one 0.48 by 0.16 mm. The caudal testis is somewhat more than its own length from the caudal tip of the body. The seminal vesicle lies beside the ovary. The length of the genital field, exclusive of the vitellaria, equals slightly more than one-third of the total body length.

Host.—Rana sphenocephala.

Locality.—Houston, Tex.

Habitat.—Lung.

Type specimen.—U.S.N.M. Helm. Coll. No. 30880.

Remarks.—This form closely resembles *Haematoloechus floedae* described above, but it is easily distinguished from that form by the short longitudinal uterine loop, of which there is only one, its unsymmetrical character, the ratio between the oral sucker and the acetabulum, and the position of the testes relative to each other.

The foregoing description of *Haematoloechus uniplexus* is based on a single specimen. No more examples were found, although more than a score examples of the host were examined. Because of the limited material and the great variation known to exist among species of *Haematoloechus*, this form must be regarded as a species inquirenda until more material becomes available. It is possible that it is an example of *Haematoloechus floedae* that is somewhat stunted and malformed by residence in an unsuitable host, but this seems hardly likely.

WILLIAMS AND COKER, 1967

HAEMATOLOECHUS (H.) VARIEGATUS LEONENSIS n. subsp.

External Features

Body is elongated, dorso-ventrally flattened, petaloid, tapering slightly anteriorly. Length 7·92–12·4 mm (average is 8·80 mm breadth 2·08–3·44 mm (average 2·76 mm). This species is found free in the central lumen of the lung. The cuticle is unarmed measuring 0·0025–0·005 mm. The oral sucker is circular measuring 0·80–0·04 mm in diameter. The ventral sucker is very much smaller and lying at about middle of the body length measures 0·13–·015 mm in diameter. The ratio of ventral sucker to oral sucker is 1:6 (text Fig. 4). It is unusual in this genus for the ventral sucker to be so small.

The ventral sucker is poorly developed due to the fact that the worm occurs free in the central lumen of the lung.

The excretory pore is subterminal on the dorsal surface and the genital atrium opens ventrally at the level of the pharynx.

Internal structures

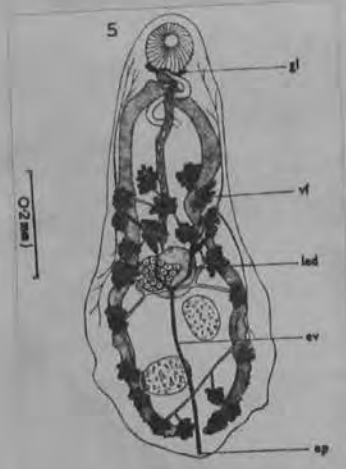
The mouth leads into a short prepharynx. Into the latter open unicellular glands. The pharynx measures 0·24–0·34 mm in length and 0·32–0·40 mm in width. There is a short oesophagus and the intestinal caeca extend almost the whole length of the body.

The excretory pore is slightly subterminal on the dorsal surface. The excretory vesicle consists of a median excretory duct which bifurcates into two lateral excretory ducts.

Each lateral excretory duct containing a dilation in the middle along its length, passes forward and then bifurcates giving rise to an ascending limb and a descending limb. Smaller excretory ducts are given by both the ascending and descending limb. (text Fig. 5).

The testes are oval in shape and occupy the central region in the posterior end of the body. The right testis, 0·56–0·88 mm long and 0·56–0·96 mm wide is in front of the left testis which is 0·56–0·9 mm long and 0·56–1·00 mm wide. The vasa efferentia run forward to the seminal receptacle and unite as they enter the cirrus pouch to the left of the level of the ventral sucker.

The ovary is pear shaped and lies behind the ventral sucker measuring 0·56–0·96 mm in length and 0·40–0·68 mm in breadth. The receptaculum seminalis is a large oval sac lying immediately behind the ovary. The oviduct arises postero-dorsally and runs backwards receiving the median vitelline duct; the oviduct is surrounded by Mehlis gland at this portion. The uterus first passes dorsally to the left testis then loops backwards and turns into coils in front of the right testis and continues posteriorly as a descending limb. It then gives extracaecal loops, the first extracaecal loop is to the left, the second to the right. These extracaecal loops extent forward to about a third of the distance between the ventral sucker and the anterior extremity. The ascending limb of the uterus passes forward with several coils along its length to the genital atrium. The eggs are small measuring 0·026–0·032 mm long and 0·021–0·022 mm wide.



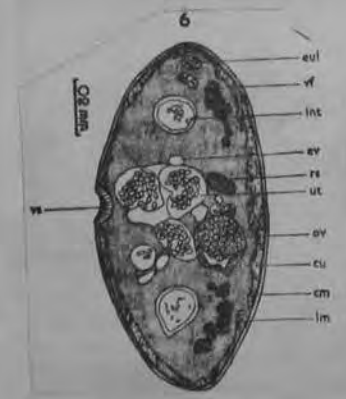


Fig. 6.—Transverse section through ventral sucker

-OVER-

A transverse vitelline duct arises from each side of the yolk reservoir. Each vitelline duct bifurcates at about the level of the ovary to give an anterior and posterior vitelline duct. Each anterior vitelline duct serves six rosette like groups of twelve to eight vitelline follicles; the right posterior vitelline duct serves seven rosette like groups of vitelline follicles whilst the left has only three groups (text Fig. 5).

Host: *Petropedates natator*

Location: Central lumen of lung

Locality: Mount Aureol, Freetown, Sierra Leone

Type specimen: To be deposited in British Museum (Nat. Hist.) Cromwell Road, London, S.W.5.

Relationships

The subfamily Haematoloechinae of the family Plagiorchiidae now includes four genera *Haematoloechus* Looss, 1899, *Ostiolum* Pratt, 1903, *Ostioloides* Odening, 1960, and *Neohaematoloechus* Odening, 1960. The last named genus erected by Odening (1960) and retained by Skrjabin and Antipin (1962) is characterized by the presence of long intestinal caeca, extracaecal uterine loops and no ventral sucker. This genus is closely related to the genus *Haematoloechus*, the only difference between the two genera being the presence of a ventral sucker in the genus *Haematoloechus* and its absence in *Neohaematoloechus*. In the present study a large number of worms from frogs' lungs were examined in which the ventral sucker was never seen. Thus they could have been assigned to the genus *Neohaematoloechus* but on sectioning, all the worms showed that a poorly developed ventral sucker was present which assigned it to the genus *Haematoloechus*. This throws some doubt on the validity of the genus *Neohaematoloechus*. Only two species of the genus have so far been described and in both cases it appears that no sectioning of the worm was made to prove that the ventral sucker was really absent. Odening (1958) using the arrangement of the vitellaria recognised three subgenera of the genus *Haematoloechus* namely *Haematoloechus*, *Anomolecithus* and *Skrjabinoeces*. In the last named the vitellaria do not extend to the hinder extremity of the body whilst they do extend to the posterior extremity in *Haematoloechus* and *Anomolecithus*. In the latter the vitellaria appear in irregular grape-like clusters, or are scattered singly whilst in the former they consist of follicles arranged in rosette shaped or regular grape-like clusters.

Odening (1958) divided the subgenus *Haematoloechus* into five groups namely *variegatus schulzei*, *sibiricus*, *breviplexus*, *longiplexus* and *varioplexus*. Rees (1964) described two species of the subgenus *Haematoloechus* which did not seem to fit any of the five groups suggested by Odening. From the description given in this paper the present materials belongs to the group *variegatus*. Of the nine described subspecies of the group *variegatus*, *H.* (*H.*) *variegatus leonensis* is easily distinguished in that the oral sucker is about 6–7 times as large as the ventral sucker. *H.* (*H.*) *variegatus leonensis* closely resembles *H.* (*H.*) *variegatus variegatus* (Rud. 1819), the type species, which has also been recorded in the Congo, in having the same size of eggs 0·024–0·032 × 0·016–0·02 mm but differs from it in being a slightly smaller species, and also in the distribution of vitellaria in the posterior end of the body.

Skrjabinoeces volgensis Sudarikov, 1950

Host: Rana esculenta

Рис. 5. *Skrjabinoeces volgensis* nov. gen. nov. sp.

9. *Haplometra cylindracea* (Zeder, 1800) Looss, 1899

Wirt: *Rana esculenta*, *R. temporaria*, *R. arvalis* und *R. dalmatina*.
Lokalisation: Lunge.
Lokalität: Bobrovec, Staudamm Dobšiná, Hrhov, Košice, Košické Oľšany, Námestovo Tvrdošín und Valaská Dubová.
Extensinvasion: 25 positive Frösche — 1,5 %.
Intensinvasion: 1—20 Exemplare.

Abb. 1. *Skrjabinoeces sp.* (Orig.)

Abb. 2. *Pleurogenes loossi* Africa, (Orig.)

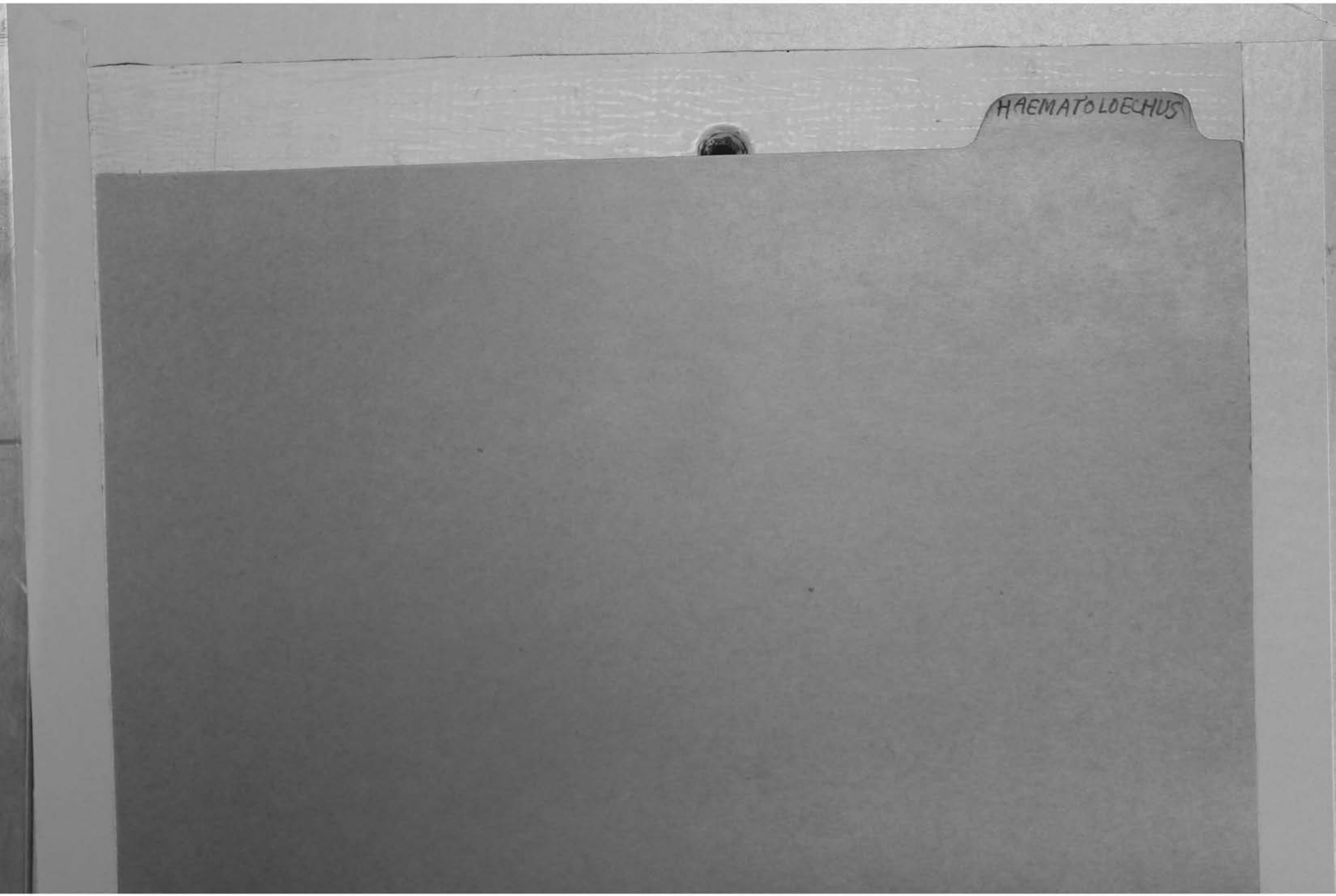
Cephalogonimidae Nicoll, 1915

10. *Cephalogonimus retusus* Dujardin, 1845

Wirt: *Rana esculenta*, *R. ridibunda* und *R. temporaria*.
Lokalisation: Darm.
Lokalität: Barca, Čaňa, Hrhov, der See Izra und Košice.
Extensinvasion: 35 positive Frösche — 2,1 %.
Intensinvasion: 1—31 Exemplare.

From: Kozak, Alexander, 1973

See Reprint: Die Trematodenfauna Der Frösche Des Karpathengebietes Der Csr
Biologia (Bratislava), 28(5): 335-350


HAEMATOLOECHUS